Electrical Review

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Contractor-Dealers Must Retain Hold on Merchandising

Keeping the Trade in the Family — Modern Selling Methods Needed to Encourage and Hold Trade—Effectiveness of Window and Store Displays Pointed Out—Seasonal Opportunities

The manufacturer of electrical goods is asking himself the question, "How can I secure the most effective local retail distribution?" and he also asks himself, "Who is going to be the ultimate and permanent electrical merchant in your town and mine?"

It must be evident to the electrical dealer and contractor that the drug store, the novelty store and the department stores are actively pushing electrical appliances and are endeavoring to work up a profitable electrical sideline business for themselves. If this electrical opportunity offers a market good enough to lure these merchants into a new field, then it certainly should be good enough for electrical men to retain; in other words, keep the electrical business in the electrical family.

The question of who is to be the logical electrical distributor is being discussed by important electrical associations quite generally. The answer is a vital one to every electrical dealer and contractor and should receive immediate and careful attention.

Seeing the large and rapidly expanding market the writer urges the dealer and contractors to make regular merchants of themselves and to broaden their opportunities by grasping and holding the growing local market for electrical household appliances and electrical goods generally. The following methods are suggested to assist the electrical dealers and contractors to keep the merchandising opportunity within the family, and it is hoped that some of the suggestions made may be of use to electrical men in their endeavor to build up and hold the electrical trade.

It has been stated that electrical merchandising has been built up backwards. That is, the retail business followed the demand of the public

Electric Store Where Women May Discuss the Merits of a Device With the Woman in Charge of Home Appliances.

Typical Examples of Effective Special Window Displays Featuring a Single Product.

for methods of using electrical current. Retailing has now reached enormous proportions, and electrical men, because of their practical knowledge, should be quick in adapting themselves to the selling end of the business. This practical knowledge gives the electrician such an advantage over the non-electrical distributor that he can, with a little effort and a study of store methods, establish himself as the electrical man in the community.

Store methods begin with the store. windows and include the equipment of and methods used in the store to bring business. The windows are the eyes of the store. First impressions, which are often lasting, are obtained by probable customers from the treatment of windows. If the value of windows was realized, electrical merchants would, I am sure, make better use of them.

The size of floor space is not the true test of the value of the store, because if the back were turned to the front, the rental value would immediately drop. Location may have some influence on the rental value of a store, but the big determining factor is the window space. One-third of the total rent of a store is for the windows. This leads to the question of using them to the greatest possible advantage. To do this means that the windows should not be used as a storehouse. Windows should not be filled with wire and like material which are not sold to the public, nor should they be crowded so that those passing cannot see what is displayed. It does mean that the window space should be attractively decorated and contain displays which will invite the passing public into the store. This is being done in other lines, and there is no reason why electrical dealers generally should not be noted for their window displays. In fact, they should have the best window in their town.

Knowing the use of electricity, why should not the dealer use it in effective window displays? Windows should be illuminated according to proper window standards to avoid glare, and to show settings in the best manner. Electric power should be used to give motion—one of the great attracting forces. Electric fans playing ribbons against the window, electric fans and rubber balloons; a young lady using an electric washer, iron or vacuum cleaner, all are some of a hundred and one methods of energizing or putting life into a window display. The window display should bolster up advertising in the local papers. If vacuum cleaners are being advertised, they should be displayed in the windows, and it should be the same with irons, washers, heaters, or any

Attractive Display Window Showing Large Variety of Small Devices and Appliances for Home Use.

other line of which a special feature is being made.

Outside the electric store there should be an electric sign. The sign need not be elaborate, but should show the location of the electric shop. If the dealer is proud of his sign and can arrange an agency for it, a circular should be sent to the different merchants in town inviting them to come and see the sign and to order signs for themselves. There are small window signs which can be used and handled to advantage. The grocer, the furniture man, the dry goods merchant, etc., are profitable customers, and a good business can be worked up in signs.

In arranging goods in a store, customers should be given free entry. The door should not be blocked for any reason. Neat shelves are imperative; they cannot be storehouses for dust and old boxes if they are to serve the purpose for which they were installed. Nearest the door should be exhibited articles such as flashlights, batteries, electric bulbs, etc., which have the greatest sale. Larger goods, such as fixtures, stoves, etc., should be at the back. Customers in passing the smaller goods will often see small things they want, and just a sight of an article brings the need to mind.

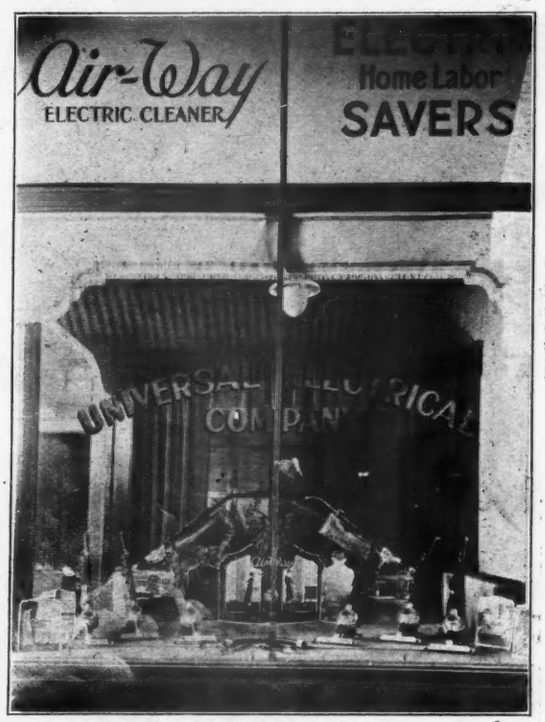
Selling, developing business, advertising and demonstrating are so interwoven that it is almost impossible to deal with one of these subjects without referring to the others. In fact, they may all be classed under one heading of "business getting" and the following paragraphs will deal specifically with business-getting methods.

It is a good thing to make sales to women. For instance, the writer's wife bought a certain make of vacuum cleaner, and she was so pleased with its operation that she had several friends in to see it, with the result that two friends, at least, have since purchased cleaners of the same make. Advertise to women. Housewives purchase three-quarters of the goods used in a home. Sell a woman an electric appliance and she will advertise it. Our electric iron has sold one to four of our relatives, and I don't know who else my wife has talked into buying electrical goods. She sold one friend an electric heater because it gave good satisfaction, and if she keeps on I think it will be up to the electrical companies to pay her a commission. The lesson is one that should not be forgotten—cater to the trade of the women. Many successful electrical dealers have found it much to their advantage to employ women clerks to demonstrate and sell the various appliances to women customers.

The elctric range, the electric washer and the vacuum cleaner offer untold opportunity for profits. Store and window demonstrations attract customers, and personal calls are very effective. Some dealers have found that renting vacuum cleaners, allowing the rental price to be deducted from the price of the machine, has brought many sales and a similar policy in regard to the electric range has also been effective. By co-operating with the central station and arranging for special rates, dealers and contractors have sold many ranges and opened up a market which has untold possibilities.

In connection with the sale of electric washing machines and irons, one dealer showed the value of selecting the psychological moment for driving home the lesson of their value. He had a demonstration of washing machines and advertised it in the local papers. In addition, he prepared circulars and letters to interest his prospective customers, timing the mailing of them so that each would reach the address when the recipient was in a receptive mood. Circulars and letters were mailed to reach the prospects on Monday, which was the usual "washday" in the vicinity, the delivery of this mail matter being, moreover, so timed that the housewife would receive her circular in the afternoon. When the selling arguments of the labor-saving washer were read after a hard day's work over the washtub they did not fail to receive sympathetic attention.

The same idea was also taken advantage of in planning newspaper advertising during the cam-

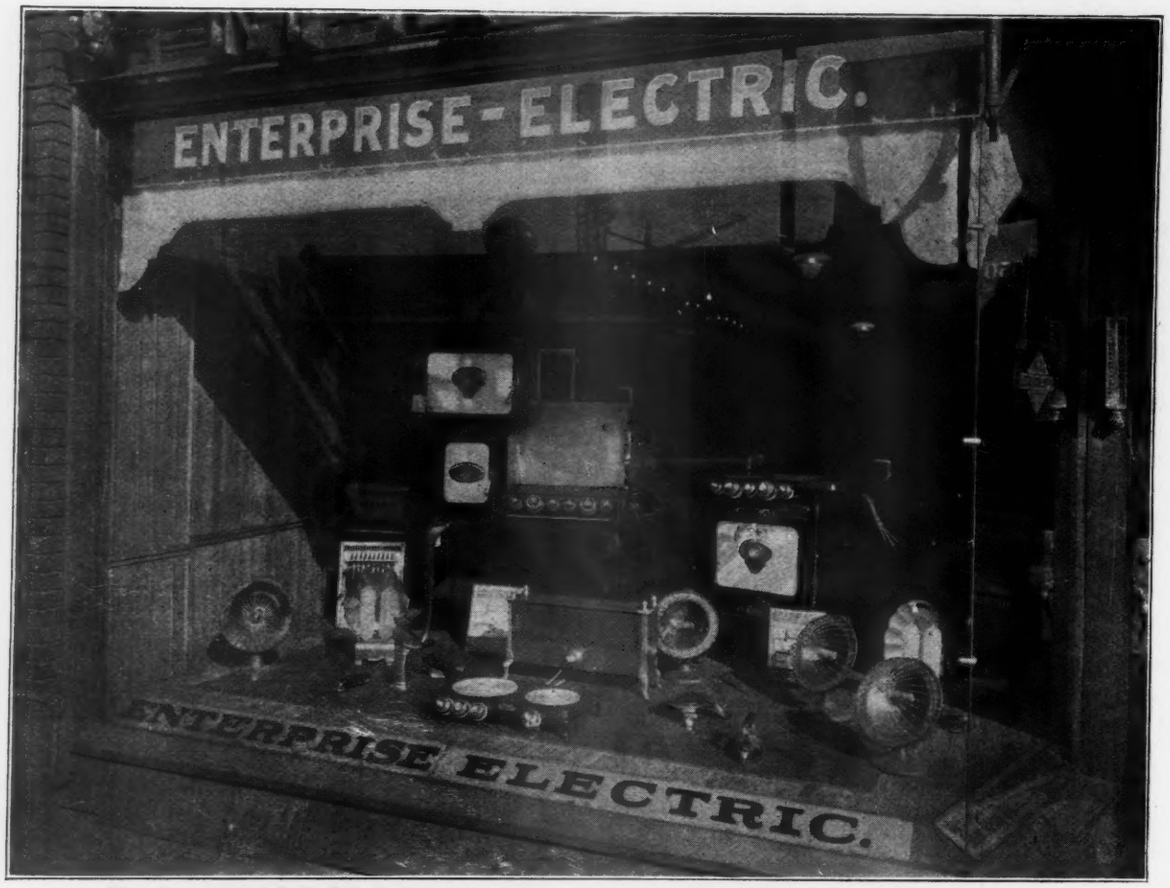


Window Trimmed to Feature One Special Device.

paign, and it was found, for example, that a washer "ad" in the Monday evening paper brought more results than the same copy used any other time during the week. It was demonstrated by another dealer that electric-iron advertising was more effective when used during the latter part of the week.

Seasonal opportunities should be grasped. For instance, at Christmas time electrical toys and decorations should be displayed; for patriotic demonstrations, colored lights. It is possible to secure the agency of a large electrical jobber who rents or sells electrical goods for patriotic concerts, festivals, demonstrations, etc., and the dealer should look into this and make the next festival a memorable one by seeing that he has a chance to figure on a display of electrical flags, signs, pennants, etc.

If there is a burglary in town the dealer should not let it pass without a large flashlight advertisement appearing near the account of it in the local paper. Accompanying this should be a dis-



Exterior and Interior Views That Show Good Practice in Merchandising Display.

Effective Display Window With Closed Back.

play of flashlights, with a card "Your Protection Against Burglars," dividing the flashlights into groups according to price.

Circumstances give many opportunities for special sales. For instance, when there is a long birth-notice column, a letter can be sent to the mothers, pointing out the value of an electric plate for heating milk and water, the electric bed pad, special electric lights and flashlights. The store windows can be used at the same time to point out the advantage of these articles in homes where there are children.

Other competitive lines are being advertised, and this affords another opportunity for driving home the lessons of electricity—no dirt, no smoke, no fumes. The gas association holds a gas-range week, a gas-light week, etc. If the hardware dealers and others are displaying and advertising ranges the electrical dealer should get up an electric-range display and advertise it—no dirt, no smoke, no fumes. "Cook by wire," as one dealer puts it in his advertisements.

The dealer should make a habit of not running out of stock. A check system on your stock, so that when a fixed minimum is reached an order is placed for more, works out to best advantage. One electrical dealer who was out of an article, instead of going to another electrical store, obtained it at a hardware store from a man who is trying to capture business which does not rightfully belong to him. This is one instance where the dealer and contractor may co-operate.

In the smaller centers the dealer and contractor is called upon to do varied classes of repair work. When a big job is brought to him he has to refuse it because of lack of equipment. This is where co-operation comes in. By making arrangements with a prominent contractor in the city he can accept the largest work and be assured that the repairs will be made with greatest care and speed. He then establishes himself in the smaller community as an out-and-out contractor.

There is an excellent opportunity for the contractor who drives home the lesson to "Wire your home." A call on a person putting up a new house or moving, and a reminder occasionally by letter or circulars will help build up a good trade. When doing the work do it to suit the person for whom you are doing the job. For instance, a certain lady wanted a light in a certain location in the basement. The workman said, "This (indicating about the center) is where we usually put it," and he attached it there. A future customer was thus lost.

In planning out work required for a house the customer should not have unnecessary expense inflicted upon him. If the job is a small one the dealer can be pleased with it and can do it efficiently, for the small order often leads to larger jobs. If complaints are made about work they should be attended to, and acceptable explanations made. In one case I know a contractor promised to make right a defective switch and, although he was reminded repeatedly, the switch was not repaired. The customer has had other work to do and it went to another contractor.

It is only by the adoption of such up-to-date methods as those hinted at that the electrical dealer and contractor can build up and retain the electrical retailing business. These merely give a few pertinent ideas, but observing the methods of other dealers, reading the trade papers, and gathering in conventions and local meetings, systems will be evolved which will keep the electric

Electric Store Window Dressed With Fitting Seasonal Display.

shop always before the people and prevent any other merchants from taking the trade away from the electrical family, where it rightfully belongs.

It has been known for some time that insulators fail in many cases from abnormal stresses of high-frequency lightning discharges, arcing grounds, line surges, etc. It has also been found that high-frequency tests show up weak spots or units in insulators or insulating materials. Consequently, insulators that have passed a high-frequency test are much more dependable because they have shown their ability to withstand the abnormally severe strains corresponding to rapid-fire hammer blows that high frequency imposes on them.

Packing Lighting Glassware for the Contractor-Dealer

Factors to Be Considered in Meeting the Requirements of this Trade—How One Jobber Solved the Barrel-Packing Problem—Quality of Cartons Adopted by Manufacturers Worth Considering

By F. B. RAE, Jr.

Will the packing of lighting glassware in cartons lead to the handling of this material by electrical supply jobbers?

That is one of the first and most important questions asked in any discussion of the carton proposition. For if the proposed reform in glass packing does not operate to include the jobbers it is not going to be much of a reform, and if it does include them it will mean an important step in facilitating the distribution of lighting equipment to the public.

Behind this lurks another question which every jobber is asking himself, namely, how far is the fixture dealer going into the sale of electrical merchandise other than fixtures? There can be no doubt that there is a marked tendency at this time for concerns heretofore restricted almost solely to the sale and hanging of fixtures and the accompanying glassware to reach out in some degree toward collateral merchandise. Some tend toward the furnishing field and are selling andirons, fireplace tile, door stops, door knockers, jardinieres, vases (which are sold "as is" or made up into portable lamps), decorative shades and a considerable variety of similar novelty merchandise. Others lean more toward electrical lines and offer appliances, especially the fancy percolators, chafing dish sets, etc.

There is another force at work upon the jobber. With the constant trend toward higher intensities in commercial illumination, a variety of standard lighting units have been developed which it is to the obvious advantage of the wholesaler to handle. At the present time quite a number of units, such as the Brascolite, Sa-lite, Reflectolyte, Duplexalite, Denzar, Four-in-One, Keldon, Ace and others, are in the market. These units are packed one in a box, generally complete. They can be dumped into stock and hustled out again without any measuring, weighing or repacking expense. They sell like hot cakes and a jobber would have to be blind on the profit side to overlook them.

Finally, there is a third factor in this jobbing-of-glassware problem. It is the growing importance of the electrical contractor-dealer as a distributor of lighting equipment. Nobody can deny that the small-town and the neighborhood electrical shops are doing a respectable proportion of the plain, everyday fixture business. Practically all of them carry and sell ordinary brackets, pendants and portables. That business is growing.

So if the present regular electrical contractor-dealer trade is edging into the fixture business and if the fixture dealer is edging into the electrical merchandise business, and if both are deep in the business of selling and installing commercial units which today are a considerable item in the jobbers' business, it looks very much as though all three are going to be links in the chain of distribution of illuminating glassware, provided that glassware is so packed that it can be stocked, handled, sold and reshipped with a reasonable margin of profit. It is entirely a question of handling, not of selling.

The first thing for the jobber—and the trade—to realize in this connection is that glass so handled must be restricted to condensed lines of absolutely standard shades. The lines selected must be of better than common quality so that they will bear a substantial profit. They must be of such design as to be available for use in practically any room in the average home. Given these three characteristics—limited lines, fair quality and wide adaptability—and we have merchandise that the jobber can handle with success.

There are today a number of jobbers who handle glass successfully. One case especially which comes to mind concerns a jobber who carries a considerable stock, sets his own prices on same, and charges the dealer 10 to 15% above the manufacturers' prices for equivalent goods. This jobber's customers pay the differential for three reasons: they save freight from factory to jobber's warehouse; they save delay because they can get prompt deliveries from the jobber's stock, and they turn their money faster because they have no capital tied up in goods in transit.

This jobber solved the barrel-packing problem by putting an almost prohibitive price on less than packing lots, a profit of practically 100% being the rule where the dealer takes a broken package.

Whether or not the electrical supply jobbers will become really active factors in the distribution of lighting glassware depends also in considerable measure upon the quality of the cartons adopted by the manufacturers. Poor containers alone will practically eliminate jobber participation in this business. Nor is it enough that glass be packed in cartons of such design and quality as to carry safely to the jobbers' storerooms; these containers must be able also safely and surely to withstand the grief of re-shipment to the dealer. Re-packing and the breakage incident thereto represents greater expense, in practice, than the margin of net profit.

Carton packing is not going to revolutionize the distribution of lighting glassware overnight, though we believe it will do so gradually. Far-sighted jobbers are going to study the problem, test it in practice and lay their plans according to definite knowledge based on experience.

Proper Quotations for Electrical House Wiring

Second of Three Sections of Report by N. E. L. A. Committee on Wiring, Devoted to a "Merchandising Plan for Selling Home Installations" — Schedule of Estimates for Various Buildings

By A. L. NELSON

Chairman, Subcommittee of Wiring Committee, National Electric Light Association.

In a preceding article we endeavored to show that house wiring should be sold in such a way that to the purchaser the price will be a more or less incidental matter and not the basis on which the work is let. To the contractor, however, the price will always be a serious consideration. To determine prices which will keep his men constantly employed upon profitable work usually requires careful figuring. On the other hand, the average contractor cannot always secure or spare high-grade estimators for house-wiring jobs.

Fortunately, all house wiring is so much alike that, except in unusual cases, it is entirely practicable to base prices on a prearranged schedule instead of estimating each job separately, and this plan is commonly used. Most of the schedules which have been devised for this purpose, however, have been so general and have omitted so many essential details that they have not been satisfactory except where applied within narrow limits. Such schedules, while indicating reasonable profits, perhaps, if averaged for a number of installations of varied types, usually show wide variations in individual cases. A contractor who attempts to wire a number of buildings of a type for which the schedule leaves too little margin, therefore, soon finds himself in trouble.

The reason for this difficulty is that most of these schedules have been based either on a uniform price per outlet, regardless of the number of lights, or on a uniform price per light without sufficient reference to the number of outlets. Neither of these plans is sufficiently comprehensive to give satisfactory results.

In the wiring of houses and apartments there are a number of important items whose cost is not proportional either to the number of outlets or to the number of lights but is constant for a wide range of conditions. If the cost of these

MEMORANDUM OF WIRING ESTIMATE

BUILDING AT 711 Blank St. CLASS 2½ Story Res.
OWNER Mr. Jones ADDRESS
TELEPHONE SERVICE Rear
PRICE $256.00 PER MONTH (DISCOUNT FOR CASH)
SALESMAN DATE April 19 20

FOR METER	CEILING	BRACKET	BASE-BOARD	TOTAL LIGHTS	SWITCH	REMARKS
Front porch	1-1			1	1	
Rear porch	1-1			1	1	
Hall 1st	1-1			1	2	3 ways
Hall 2nd	1-1			1	2	3 ways
Parlor	1-4		1-1	5	1	
Dining room	1-4	*	1-2	4	1	*Sep. C'kt.
Kitchen	1-1		1-2	3	1	
Cellar	1-1			1	1	
Furnace	1-1			1	1	
Laundry	1-1	*	1-2	1	1	*Sep. C'kt.
Bath Room	1-1	1-1		2	1	
Bed room	1-1		1-1	2	1	
Bed room	1-1		1-1	2	1	
Bed room	1-1		1-1	2	1	
Bed room	1-1		1-1	2	1	
Bed room	1-1		1-1	2	1	
	16	1	9	31	18	

NO.	SCHEDULE NO. 20	PRICE	
16	CEILING OUTLET @ 4.60	73	60
1	WALL OUTLET @ 5.60	5	60
9	BASEBOARD OUTLET @ 5.75	51	75
	P. S. & P. OUTLET		
14	S. P. SWITCH OUTLET @ 5.15	72	10
4	3 WAY SWITCH OUTLET @ 5.50	22	00
1	SERVICE 1ST. METER AND 1ST CKT.	14	35
1	2ND CKT. 17 TO 32 LIGHTS	6	90
1	ADDITIONAL METER WITH ONE CKT.		
	ADDITIONAL CKT. ON ONE METER		
2	OTHER ADDITIONAL CKTS.	7	70
	STORE WIRING ADDITIONAL CHARGE		
	HALL OUTLET		
	HALL ALTERNATING SWITCHING		
	CIRCUITS NO SWITCHES		
	CIRCUITS OVER STORES		
	EXTRA SERVICE CHARGE		
	25% FOR STORE WIRING		
	DROP CORDS		
	WIRING GARAGE		
	SERVICE EXTENSION FT.		
2	Duplex Receptacles add'l.	2	00
	Total	256	00

Wiring Cost Estimate, Showing Procedure Involved in Computing a Specific Job.

items is averaged into any uniform price per outlet, or per light, there are sure to be wide differences in the margins of profit.

It will be obvious, for instance, with a moment's thought, that if two installations each have the same number of outlets, but one of them has only 15 lights while the other has 17, the cost per outlet may differ considerably. In the first case a single circuit will be all that is necessary while in the second case two circuits will be required. On the other hand, if both jobs called for 16 lights, but in one instance they were to be connected to four outlets and in the other to eight outlets, there might then be a considerable difference in the cost per light.

In small installations, also, the service entrance is often a noticeable part of the total cost. There is a fixed minimum for this item for a wide range in outlets and its cost under the regulations in effect in many cities may have a considerable influence on the cost per outlet, according to whether it is divided among six outlets instead of 12, or among 10 outlets instead of 20.

Character of Building Important Factor in Cost of Installation.

The character of the building, too, is important. It is much less expensive to install a given number of outlets in a 2-story building with open attic and unfinished basement, than it is if there is no basement, and if the roof is flat. Such a distinction, if not properly allowed for in pricing the job might easily make the difference between a profit and a loss.

Other items not at all proportional to the number of outlets or the number of lights might also be mentioned, but the above should be sufficient to illustrate the idea and to show why existing schedules for quoting prices have frequently proven unsatisfactory, and why house wiring is not more eagerly sought for by many contractors who have tried to use such schedules.

HOUSE WIRING SCHEDULE.

Table 1. Prices of Service Entrances and Circuits for Residences.

Type of Building.	Service with meter & first Circuit. (1 to 15 lights)	Second Circuit (17 to 32 lights)	Each additional Circuit (33 to 48 lights etc)
One story building with flat roof.	$19.20	$6.90	$3.85
All other residences.	14.35	6.90	3.85

Table 2. Outlet Prices for Residences.

Schedule No.	Stories	Type of Building. Description	Wiring of Outlets (including Switches)	Ceiling Outlet	Wall Outlet	Baseboard Outlet	Push Switch and Plug Outlet	3 Pt. Switch Outlet	4 way Switch Outlet.
1	1	Open attic, no basement, or unfinished basement.	6	$3.95	$4.45	$5.45	$5.75	$4.60	$5.15
2	1	Open attic, finished rooms in basement.	6	4.30	4.90	5.45	5.75	4.60	5.15
3	1	Flat roof, with or without basement.	6	4.30	4.90	5.45	5.75	4.60	5.15
4	1½	With or without basement.	6	4.30	4.90	5.45	5.75	4.60	5.15
5	2	Peak roof, open basement.	7	4.90	5.30	5.45	5.75	5.15	5.50
6	2	Peak roof, no basement, or finished rooms in basement.	7	4.60	5.60	5.75	6.00	5.15	5.60
7	2	Flat roof, open basement.	7	4.90	5.85	5.75	6.75	5.15	5.50
8	2	Flat roof, no basement, or finished rooms in basement.	7	5.15	6.15	6.00	6.60	5.15	5.50
9	2½	With open basement	7	4.60	5.60	5.75	6.00	5.15	5.50
10	2½	With no basement, or finished rooms in basement.	7	5.00	6.00	6.15	6.45	5.15	5.50
11	3	Ordinary Residence.	8	6.00	7.60	7.45	6.60	6.30	6.25
12	4	Ordinary Residence.	10	6.30	7.90	7.45	6.60	6.30	6.25

Tabulated Data Used in Estimating Wiring Costs.

While the above analysis at first thought may seem to indicate that, after all, the wiring of houses is too complicated to permit satisfactory results from the use of schedule prices, this idea is not at all warranted. There are, it is true, many items to be considered which heretofore have frequently been overlooked, but it is entirely possible to devise schedules which make due allowances for such items, and which are yet so simple that they can be readily used. One such schedule has been devised by the Commonwealth Edison Co., of Chicago, and used by it and local contractors for several years.

This schedule has been found not merely to give correct prices on the basis of averages, but to yield uniform profits for the individual jobs, and thus to conform to sound business principles. It has been used in the pricing of house wiring totaling more than half a million dollars per year, and it has given complete satisfaction. Through the courtesy of the Commonwealth Edison Co. this schedule is attached and the following explanation of its fundamental principles is given:

In presenting this schedule, it is not the actual figures which it is desired to show, but rather the general plan on which they have them arranged. The prices themselves were, of course, influenced very largely by the methods of wiring, the wage rates and the technical requirements prevailing in Chicago. The general principles, however, will apply anywhere. When these principles are understood, it is a comparatively simple matter for any contractor or group of contractors to prepare a similar schedule for particular localities.

Principles of Comprehensive Schedule That Has Proven Satisfactory.

The first and most important principle on which this schedule is based is that in making up the price for wiring buildings the service entrance (including first meter loop and first circuit) should be covered by a separate item instead of being averaged with the outlets, and that additional circuits when required should be covered in the same way. In the case of apartment buildings, also, additional meter connections after the first should likewise be listed independently. The reasons for this procedure have already been referred to.

The second new idea is, that the effect of the size and type of building on the various items of cost should be recognized as well as that of the number of stories. The differences or the ease with which a 2-story building having an open attic and an open basement can be wired (since the men can work from below as well as above for the first story, and from above for the second story) as compared with a corresponding building with no attic and no basement, has already been referred to. It is obvious that a 3-story building, even if it has both the attic and basement, will be more difficult to wire than a 2-story building of the same type, on account of the difficulty in reaching the middle story.

There is another element, also, that has been taken account of in making up the schedule especially in the matter of residences. A house with three or four stories is usually of more expensive construction than one of lesser size

and the wiremen must exercise greater care, and hence less speed in working in it.

The third principle upon which the schedule is based is, that certain types of outlets are inherently more costly than others. A ceiling outlet, for instance, costs least of all on account of the much greater ease of fishing between floor and ceiling and the shorter average length of conductors per outlet.

It will be seen from the schedule that, in addition to the gradations in prices for the several items in accordance with the above, the prices have also been carefully arranged to care for other variations in procedure, which have been found by experience to affect the cost. It will be noticed, for instance, that for service entrances the price is less for a 1-story building with flat roof than for a similar building with peak roof, or for buildings of more stories. This is due to a local requirement in Chicago that the service entrance in conduit must extend to the level of the second-story ceiling, or on buildings of less than two stories, to the highest point on the building. A certain length of conduit, conductors, etc., with labor is saved, therefore, on 1-story flat roof buildings on account of their lesser height.

Application of Schedule to Apartment Buildings in Chicago.

In apartment buildings an additional charge is made on circuits where switches have been omitted. This is apparent when it is considered that switch outlets are usually used as junctions and as pull boxes. In proportion, the work is made difficult by the omission of switch outlets, and the increase in cost due to this item increases with the size of the building.

Outlets in public halls in apartments cost more than other outlets because, usually, they are supplied from a separate meter and the average length of conductors for such outlets is greater than in the living rooms.

Apartments over stores are more difficult to wire because of the lack of partitions in the stores. It is harder to reach such apartments with conductors from the basement, where these must pass through a store, than it is when they pass through another apartment where numerous partitions are available for concealing them. Frequently, also, the conductors are longer on account of the way in which they must be run.

Where certain apartments only are wired, and not the entire building, the human nature of the tenants of the adjoining apartments is often a matter to be reckoned with. If the whole building is being wired it is impossible for any tenant to know whether the wireman's presence in his apartment is entirely for his benefit of not. If, however, the second apartment only is being wired the tenant on the third floor has no doubt on this matter and the contractor's force must often be diplomats as well as craftsmen.

As a convenient means of illustrating the working of the schedule it may be applied to the residence referred to in the first section of this article on "Selling the Wiring Idea," which appeared in Electrical Review, issue of Feb. 26. This has been worked out in detail on the estimate sheet accompanying this article. It will be seen that while all of the various items are taken fully into account, the pricing of the job with the aid of the schedule is very simple, and that the total figure is $256.

HOUSEWIRING SCHEDULE.

Table 3. Prices of Service Entrances and Circuits for Apt. Bldgs.*

Type of Building	Service with meter and first Circuit	Each add'l meter with first Circuit	Add'l for each Circuit on any meter	Add'l for each other Circuit in any meter
One story, flat roof	$13.80	$4.10 to 6	$ 6.90	$ 3.45
One story, peak roof, or 1½ story	14.35	4.18 to 6	6.90	3.45
Two story	17.25	4.48 to 6	6.90	3.63
Two and one-half story	19.35	4.80 to 6	6.90	3.93
Three story	19.35	4.80 to 6	6.90	3.35
Four story	19.35	4.35 to 5	6.90	4.15

* The prices listed for service entrances are for single buildings, or for double buildings, not exceeding one and one half stories. For double buildings of 2 stories or more, the prices for Service Entrances are 50% more than those given in the table.

* For each Circuit having no Switch, the price in the table will be increased by $2.00 for two story buildings, $2.25 for 2½ or 3 story buildings, and $2.80 for 4 story buildings.

** There is usually required one meter for each apartment in the building and one meter for public hallways etc.

Table 4. Outlet Prices for Apartment Buildings.*

Schedule No.	Stories	Type of Building — Description	No. Outlets per circuit (including switches)	Ceiling Outlet	Wall Outlets	Basement Outlets	Post Service Pkg Outlets
13	1	Open Attic, no basement or unfinished basement	6	$3.35	4.45	5.45	8.75
14	1	Open Attic, finished rooms in basement	6	4.30	4.90	5.65	8.75
15	1	Flat roof, no basement or unfinished basement	6	4.35	4.90	5.60	8.75
16	1	Flat roof, finished rooms in basement	6	4.60	5.20	5.75	8.00
17	1½	With open basement	6	4.30	4.90	5.65	8.75
18	1½	With finished rooms in basement	6	4.60	5.20	5.75	8.00
19	2	Peak roof, open basement	6	4.30	5.10	5.65	8.35
20	2	Peak roof, no basement or finished basement	6	4.60	5.60	5.75	8.00
21	2	Flat roof, open basement	6	4.60	5.60	5.75	8.00
22	2	Flat roof, no basement or finished basement	6	4.90	5.65	6.00	8.80
23	2½	With open basement	7	4.60	5.60	5.75	8.00
24	2½	With finished rooms in basement	7	5.00	5.80	6.15	8.65
25	3	Peak roof, open basement	7	4.90	5.65	6.00	8.30
26	3	Flat roof, open basement	7	5.00	5.80	6.05	8.30
27	3	Peak roof, no basement or finished basement	7	5.15	5.95	6.20	8.60
28	3	Flat roof, no basement or finished basement	7	5.30	6.05	6.30	8.60
29	4	With open basement	7	5.30	6.05	6.35	8.60
30	4	With finished rooms in basement	7	5.55	6.25	6.60	8.90

* Single pole Switch Outlets $4.60 each in buildings of 2 Stories or less and $5.15 each in buildings of 2½ to 4 Stories.

* Three way Switch Outlets $5.15 each in all buildings of 1 to 4 Stories.

* Outlets of any kind in public halls, $2.80 each in all buildings of 1 to 4 Stories.

* Where there is alternating switching in public hallways (i.e. where lights are controlled by two or more switches) add $5.00 for each building.

Tabulated Data Used in Estimating Wiring Costs.

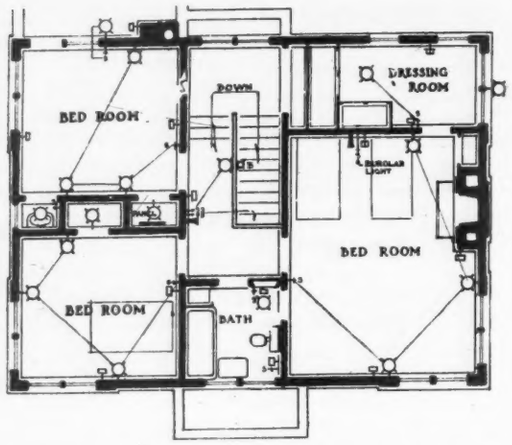
Schedules 20, 22, 27 and 28 should each read in part "finished rooms in basement" instead of "finished basement."

It will be evident to any one who has followed the matter thus far that this schedule is the result of study and experience. After deciding to prepare a schedule the Commonwealth Edison Co., to secure correct data, had an inspection made of all house wiring work completed during a period of 3 mo. This data covered type of building, construction and complete wiring layout. Labor and material costs were analyzed on each job and average costs secured and listed with other jobs of like type. All work in progress was priced on piece-work basis as the job progressed. The totals were then segregated by class or type of building, and from the final results the present schedule was computed.

While a tremendous amount of time and effort was thus required in making up the original schedules, the work of adapting them to the wages, methods and other conditions of any particular locality should be comparatively simple now that the way has been indicated. More equitable prices for the public as well as more uniform profits for contractors should result from the wider use of similar methods in every city, as well as more rapid progress toward 100% wiring and the general good of the entire electrical industry.

The price for wiring any residence or apartment building is made up of a charge for service entrance, meter connections and circuits, together with a charge for each outlet. These prices vary with the size and construction of the building as well as with the type of outlets, as indicated in the accompanying tables. Under certain circumstances there are various other items to be charged for, as likewise indicated.

Prices cover wiring ready for the attachment of fixtures, but do not include any fixtures or other devices. These items should be covered



Second Floor Plan of Building Covered by Wiring Estimate of $256.

by a separate contract. In certain cases, however, single sockets at each outlet, either hung by drop cords or mounted on the wall, are considered sufficient and these may be included in the wiring contract at the prices given in Table 6.

Schedule prices apply to ordinary residences and apartment buildings of standard types and cover a large proportion of all buildings likely to be encountered. Special cases, however, such as hotels, large apartment houses, high grade residences or residences converted into apartments, etc., should be estimated individually.

Where additional outlets are specified after the work of wiring has been started the price for these outlets will be 10% greater than the prices given in the tables. Where the number of the outlets originally specified is reduced after the work is in progress, the credit allowed will be 10% less than the prices given in the table.

HOUSE-WIRING SCHEDULE.

Table 5: Outlet Prices Where One or More Apartments Only Are Wired and Not the Complete Building.

Schedule Number.	
31	For wiring first apartment in 3- or 4-story building, charge 2-story schedule plus $0.50 per outlet.
32	For wiring second apartment in 3- or 4-story building, charge 3-story schedule plus $0.50 per outlet.
33	For wiring third apartment in 4-story building, charge 4-story schedule plus $0.50 per outlet.
34	For wiring top apartment in 3-story building, charge 3-story schedule plus $0.35 per outlet.
35	For wiring top apartment in 4-story building, charge 4-story schedule plus $0.35 per outlet.

Residences.—For residences the charges for service, meter connections and circuits are as given in Table 1. To these must be added the proper charges for outlets in accordance with Table 2.

Apartment Buildings.—For apartment buildings the charges for service, meter connections and circuits are as given in Table 3, and the notes below it. To these must be added the charges for outlets in accordance with Table 4.

The prices given in Table 4 are based on wiring the entire building at one time. If one or more apartments only are wired, instead of the complete building, the prices given in this table must be increased in accordance with Table 5.

Stores.—Where apartment buildings include stores an additional charge of $5 per circuit will be made for wiring apartments over the stores.

In wiring stores the following charges should be added to the regular schedule prices.

1½-story building	$11.50
2- to 4-story building, open basement	12.65
2- to 4-story building, finished rooms or no basement	16.10

These prices cover wiring of the store by using exposed conduit along the corner of the ceiling and concealed armored cable from this conduit to the various outlets. If it is desired to have all the wiring concealed the price for meter connection (not including service), circuits and outlets for the store will be 25% greater than the corresponding figures in Tables 3 and 4.

Garages.—For wiring individual garages and connecting them to the circuits and meters of residences or apartments the price is made up of a charge for extending the circuit, a minimum price for wiring (which includes certain outlets) and a charge per outlet for additional outlets.

The minimum charge for wiring is $28.75, and this covers one drop cord, one wall receptacle and one switch, together with a 15-ft. extension cord. For additional outlets the charge is $3 each.

Table 6: Prices for Wall and Drop-Cord Sockets Where These Are Used Instead of Fixtures.

	Wall socket.	Drop cord with steel box cover.	Drop cord on gas outlets.	Drop cord with brass canopy.
With key socket, each	$0.80	$1.05	$1.40	$1.50
With chain pull socket, each	1.05	1.25	1.60	1.75

Where wire guards are desired in any of the above cases, add $0.30 each; duplex receptacles add $1 each.

Service Extensions.—Where service must be carried along outside wall of a building the charge is $0.35 per conduit foot. Overhead lawn service between buildings, first 20 ft., $5.15, and $0.09 per ft. additional. The capacity covered by these prices is 100 lights or less.

The above mentioned prices, and those in the tables, were used in Chicago prior to May 1, 1920. They cover the use of rigid conduit for all wiring in basements and the use of armored cable for all other wiring. For service entrances the prices cover No. 14 wires in ½-in. conduit where the current is 15 amperes or less, and larger sizes of wire and conduit, where necessary, to comply with the National Electrical Code requirements.

Where the current for a 2-wire service would be more than 24 amperes, a 3-wire service is used.

Service entrances are carried to the level of the ceiling of the second story for buildings of two or more stories, and to the highest point of the building in the case of buildings of less than two stories, as required by the Chicago city code.

The prices were based on a wage of $1 per hr. for wiremen and on the prices for material which were in effect at that time.

Industrial Heating Offers Field for Contractor-Dealers

Uniform Conditions Maintained in Large Factory Building by Installation of Radiators— Many Applications in Both Low and High Temperature Process Work — Their Practical Advantages

By WIRT S. SCOTT

Manager, Industrial Heating Section, Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.

Electrical manufacturers apparently appreciate the tremendous possibilities in the development of the industrial-heating load, but they alone can not develop this field. So far the electrical manufacturers have done the major part in the investigation and application work and with comparatively little help from utility companies and contractors, who, in the long run, will be the greatest benefactors. Leading electrical manufacturers have organized separate departments for industrial-heating work and are developing apparatus to meet the requirements just as rapidly as possible. They are also training a corps of specialists for the development and handling of this business.

It is but a matter of time until every central-station company throughout the country will have as many power salesmen engaged in industrial-heating work as they now have on industrial-motor work. The available business is therefore worth going after, and the character of load is almost ideal. If the electrical manufacturers with their limited number of experts can accomplish in a year the work that was done during 1920, enormous progress could be made during 1921 if each central-station company would put on specialists for the development of the industrial-heating field.

One of the most interesting and progressive steps made to date is in the heating of a large textile mill electrically. It has been an accepted fundamental principle that electricity could not compete with coal for the heating of buildings. Recent investigations have been made, however, which show that electricity can compete with coal, taking all the facts into consideration when energy is obtainable at $0.01 per kw-hr. and coal costs $8 per ton.

Electrical Energy Employed in General Heating of Factory.

The Canadian Cottons Co. of Canada, after a thorough investigation and examination of the proposition, entered into a contract with the

Continuous-Conveyor Type of Electrically Heated Oven for Use in Connection With Automobile-Body Enameling.

Westinghouse Electric & Manufacturing Co. for the heating of one of their new mills being built at Milltown, N. B. The building is 184 ft. wide by 410 ft. long, two stories high, and has an installed capacity of 2200 kw. for maintaining a temperature of 65 deg. F. within the building with an outside temperature of 20 deg. F. below zero.

A hot-air system of heating is employed, this being recognized as the most effective manner of building heating, besides providing good ventilation at all times. During the summer the system may be operated strictly as a ventilating system without the heat being turned on. This does not interfere with the humidifying system usually employed in textile mills and, as a matter of fact, should result in a more uniform humidity being maintained. Heaters are concentrated in two centralized systems, one for each half of the building, and are placed in housings similar to those used with steam coils, the air being drawn through the heaters by a suction fan and distributed through the building by means of vent pipes.

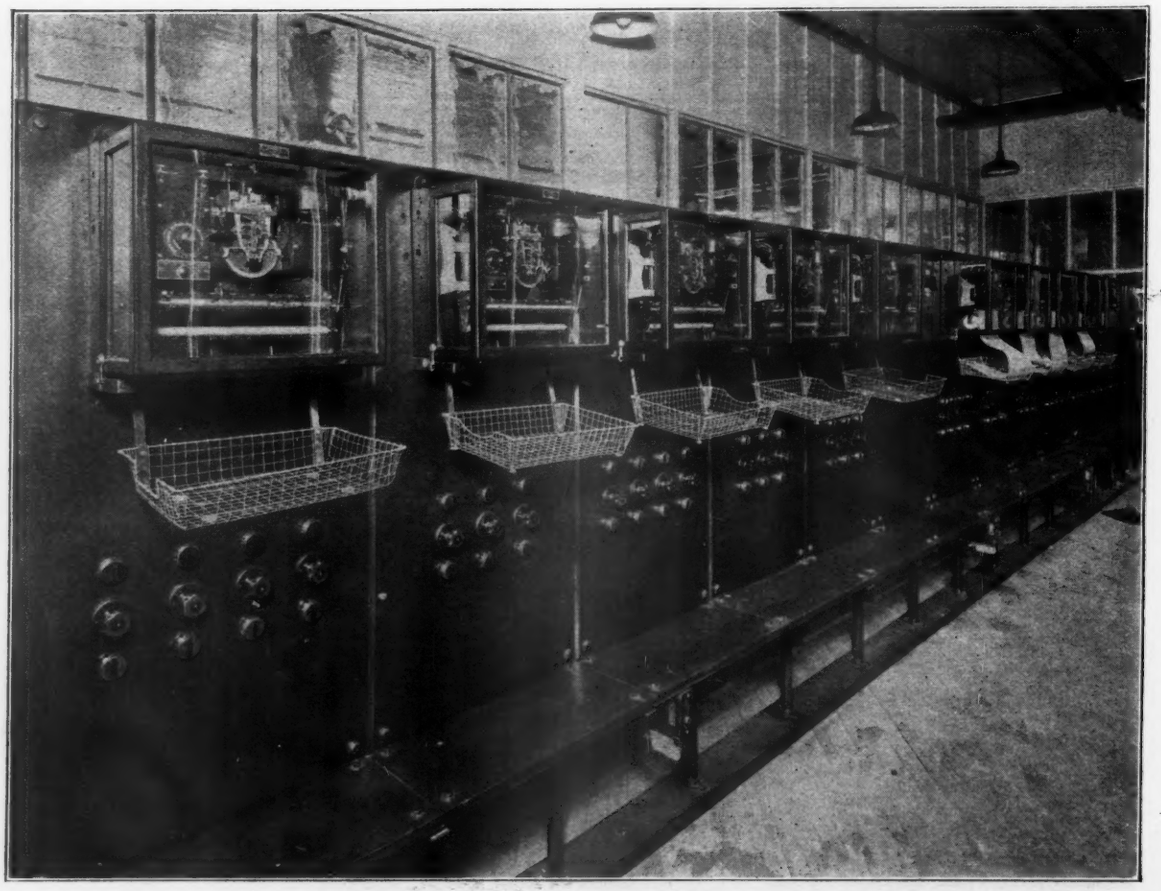
Contact-making thermostats are used for maintaining the temperature constant within narrow limits. In connection with magnetic contactors these thermostats hold the temperature continually and entirely automatically at the temperature of 65 deg. F. throughout the entire 24 hrs. regardless of the outside temperature. The installation is thoroughly safeguarded so that in the event of the power failing on the motor driving the exhaust fans the current is automatically cut off from the heaters. It is further safeguarded to the extent that if the temperature within the heater housing goes beyond a predetermined limit the heaters are automatically disconnected from the line. In the event that the temperature within the room should go beyond a given point, due to the possible failure of the controlling thermostats, a separately operated thermostat will cause the sounding of a loud gong which will serve to attract the attention of the watchman.

By the electrical heating of mills where water power is available there is an enormous opportunity for conserving natural resources, particularly the coal. Steps may be taken at once by those companies who are fortunate enough to operate plants deriving their power from waterfalls, or those who purchase energy from water-power plants, to investigate the advantages offered by means of electric heating.

Electrically Heated Core Ovens Used in Foundry Work.

Scientific baking of cores is almost an unknown subject in this country and, through lack of information, a great waste in labor, material and fuel has resulted. A visit to the various foundries will demonstrate that not one-half of the core-baking ovens have thermometers to indicate the temperature. Furthermore, little attention is given to the amount of ventilation required, and those who make a pretense of controlling it do so on a hit-and-miss basis.

On the supposition that there is one best operating temperature in any heating process and that



Instrument Board for Controlling Temperatures of Electrically Heated Ovens in Plant of Cadillac Motor Car Co., Detroit.

there is a definite rate of heat application most suitable for the heating of any piece of work to that temperature, attention has been turned to the core-baking field as virgin territory. There has been comparatively little done in electrifying core-baking ovens in the past, due primarily to the lack of specific data as to the advantages to be gained by heating such ovens electrically. There was no questioning that it could be done, but there was almost no data showing the effect of baking cores electrically and scientifically.

The Westinghouse Electric & Manufacturing Co. undertook the work of investigating the baking of cores electrically, carrying out this research work along lines of investigation made in connection with other baking processes which now have become standards for many industrial plants. The research department was placed in charge of the investigation work and a core-baking oven was purchased and installed in the brass foundry. Tests were run extending over a period of 6 months, during which time cores of various mixtures were baked with varying amounts of ventilation and at different temperatures. This oven was operated on standard production work, but test pieces were placed at different points in the oven along with the work. At the end of each bake the work was thoroughly examined as to its condition and the test pieces were subjected to crushing load and tensile-strength tests.

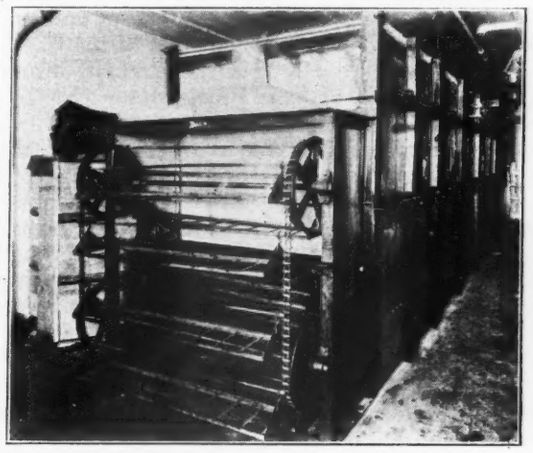
Experimental Core Oven Now Used in Regular Production Work.

The conclusion drawn from these tests resulted in strong recommendations being made for the adoption of electric heating in the brass foundry of the company. Consequently, the electric oven purchased on the experimental order has been taken over by the foundry and is now in daily operation. This oven is a favorite with the workmen due to the ease of operation, the small amount of attention required and the high-grade product turned out. The cores are 100% stronger than those baked in a similar gas oven, are free from carbon deposit and are uniformly baked. The length of time required for baking has also been materially reduced.

The advantages found to actually exist, which were of commercial value in the works of the company, were as follows: (1) A core is produced that is from 100 to 200% stronger than is obtained in a similar gas-heated oven. (2) Cores are uniformly baked, due to the fact that heaters may be placed in the oven at suitable points to give the proper heat distribution. After this arrangement is determined this condition remains fixed and is not subject to variation at the will of the operator as with fuel-fired ovens. (3) Rejected cores are eliminated, due to the thorough and uniform baking. In some foundries the rejects amount to 40%, and a 30% rejection is a common occurrence. (4) Automatic temperature control is obtained. This feature removes the human element to a large extent from the baking operation and assures the cores being baked at a definite and predetermined temperature. (5) Ventilation may be regulated to the desired amount by means of a motor-driven exhauster.

A continuous-conveyor type of bread-baking oven that is electrically heated has been installed at the plant of Fisher Bros., Cleveland, O., having a capacity of 900 loaves of 1.5 lbs. each, or 1350 loaves of 1-lb. weight per hr. The oven is 23 ft. 10 ins. long, 6 ft. 4.5 ins. wide and 8 ft. 4 ins. high, and is covered with 3 ins. of high-grade insulation. The oven is equipped with 56 type C oven heaters, giving a total capacity of 140 kw. at 220 volts.

The bread is loaded onto a moving shelf after



Electrically Heated Bread-Baking Oven at Plant of Fisher Brothers Co., Cleveland.

which it enters the oven, traveling in an up-and-down motion, progressing forward and coming out the opposite end baked. Temperature is controlled automatically by means of a contact-making thermostat and magnet switches. Heaters were located to give a proper distribution of heat after which that condition remained fixed and is not subject to variation, so that by means of the automatic temperature-control system which holds the temperature within the oven at 450 deg. F. a uniform product is assured.

Tests show that the bread made in the electric oven is much more uniformly baked than in a gas oven of very similar design. One of the best recommendations for this equipment is to be found in the fact that an order has been placed for a duplicate oven.

Baking Ovens Employed in Finishing of Enameled Parts.

Tests have been made for the purpose of determining the advantages gained in baking railway-motor armatures electrically, with the result that the Westinghouse Electric & Manufacturing Co. has standardized on this method of baking for the repair shops in its service departments. Process specifications were prepared covering the complete method of handling the armatures in order to insure the obtaining of the maximum advantage of electric heat in the baking of armatures and field coils. It was found that three sizes of ovens practically fill all requirements in covering the entire field. Beyond a certain size it is better to install more than one oven.

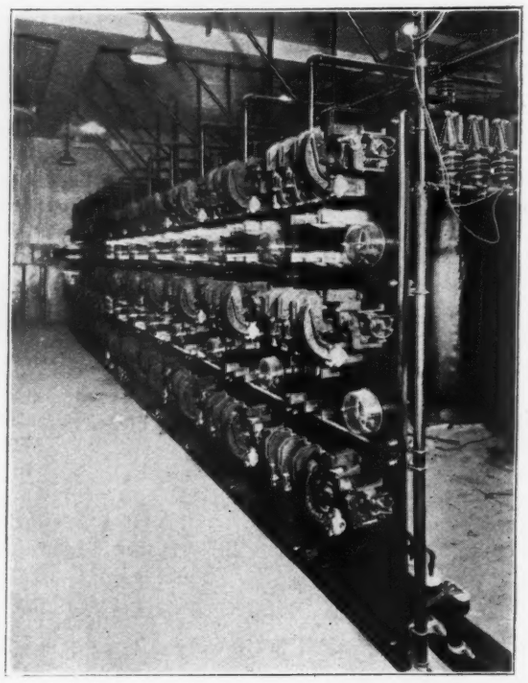
Many of these ovens have been installed during the past year, with the result that this method of baking is becoming standard. Tests have shown conclusively that a dipped and baked armature has a long life, and that its trips to the re-

pair shop are rare. An electrically-heated oven greatly shortens the time that a motor is out of service for repairs. Due to the automatic temperature control there is no danger of overbaking. An electrically heated oven does not require expert supervision, as is shown by the fact that several that have been installed and used by parties who had never seen this equipment except in catalogs are now operating successfully in the baking of railway armatures, field coils, etc.

Three noteworthy installations have just been completed for the baking of enamel on automobile fenders, hoods, etc., at the plant of the Cadillac Motor Car Co., Detroit, the Packard Motor Car Co., Detroit, and the Buick Motor Car Co., St. Louis. The ovens at the Cadillac and Buick plants are of the continuous-conveyor type, the work being hung on an overhead moving conveyor which automatically carries the parts down into the dip tank of enamel, up the drain board, into and through the ovens, progressing through three ovens continuously for 3-coat baking without removing the work from the conveyor. Heating equipment having a capacity of 2000 kw. is installed in the Cadillac ovens, and 1680 kw. in the Buick ovens. These ovens are maintained at a temperature of 450 deg. F. by means of automatic control equipment.

Heat Treating Furnaces for Operation at High Temperature.

The Packard Motor Car Co. placed one of the largest orders during the year for heating equipment. This will be used in connection with the production of a new 6-cylinder car, and consists of 22 semicontinuous-conveyor oven equip-



Control Panels for Electrically Heated Enameling Ovens.

ments requiring a capacity of 3120 kw. The temperature of each oven is automatically controlled. The Packard company previously had some 12 or 15 electrically-heated ovens in operation.

During the past year considerable experimentation has been done and much progress made in the development of a reliable and satisfactory high-temperature heat-treating furnace, with the result that there are now available electric furnaces for working temperatures up to 1800 deg. F., and up to 2000 deg. F. in some special cases.

A 120-kw. furnace has been in operation for over a year for the heat treating of automobile springs. This furnace is operated at 1560 deg. F. Two tests made at different intervals show energy consumptions of 1520 kw-hrs. for 15,000 lbs. of springs and 1550 kw-hrs. for 16,330 lbs. of springs treated. Initial temperature of the steel was 70 deg. F., and the weight of the individual charge was 675 lbs.

A 72-kw. furnace is used for annealing glassware at a temperature of 1200 deg. F. This furnace is 22 ins. wide, 10 ft. long and 5 ft. high, and is of the overhead-conveyor type. Several thousand goblets were annealed in the oven, the goblets being placed in metal containers consisting of nine trays, holding 25 goblets each—five per row and five rows deep. From this total 65 goblets were selected at random, care being taken to select them from different parts of the furnace, and tested in a spectroscope. A total of 64 showed absolutely no refraction of light rays and were passed as A-1 grade. One goblet had an almost imperceptible refraction of light rays and was therefore rated in this test as B-1. The physicist making the test stated that, compared with their general run of product, this one goblet would ordinarily have been A-1 grade. In their natural-gas-fired annealing lehrs they have very few strictly A-1 grade pieces, a majority being B-1 grade. A quantity also of C-1 grade product, the lowest possible grade, is produced.

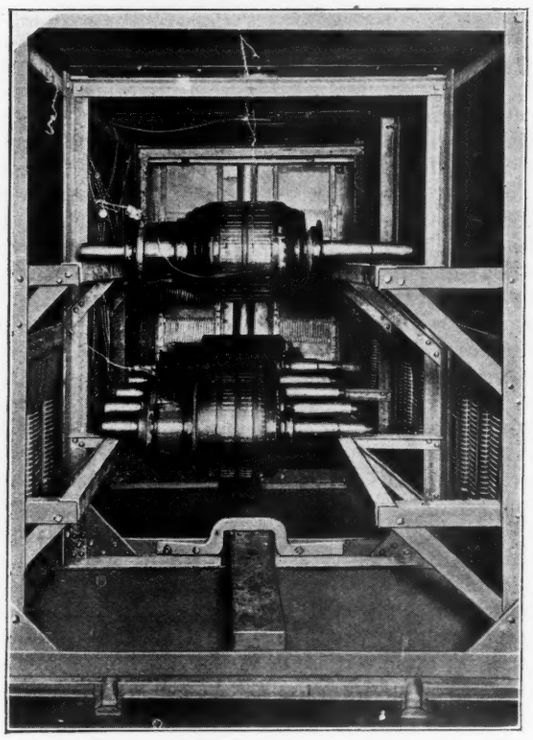
All glasses passing through the furnace were of a bright polished finish, while glasses passed through the natural-gas furnace have a slight blue finish. Manufactured gas presents a deposit greater than natural gas, and fuel oil deposits a decided white-powder finish necessitating washing and polishing and is therefore prohibitive.

During the war period 3,500,000 safety springs for shrapnel fuses were heat treated in an electric furnace at a temperature of 1200 deg. F. without a single rejection and without reheating any batch. The shrapnel-fuse springs were heat treated in brass tubes into which was poured approximately one teaspoonful of water. Conversion of the water into steam prevented oxidation. Approximately 550 lbs. of brass, including container tubes, were heat treated every 20 min. Hand control was used consisting of a transformer having a large number of taps and radial knife switches. The temperature and time of heating was signalled by an especially built alarm clock ringing at irregular predetermined periods, such as 1 min., 2 min., 3 min., at which times the operator placed the radial switches in certain predetermined contact positions. With a fuel-fired furnace an exact predetermined step-by-step temperature control is impossible, and it was only by the use of the electric furnace in which the heating was applied on all sides that the results attained could be secured.

An electric furnace is in operation for the heat treating of approximately 4000 lbs. of brass per

week for the United States Government. The electric furnace is used because of the fact that it is the only type which can uniformly control crystallization of brass according to the rigid specifications to be complied with.

Fusing of bifocal optical lenses must be done at a critical temperature, besides requiring a uniform temperature to prevent resulting strains, and a clean atmosphere to prevent spoiling the



Armature-Baking Oven in Shops of Brooklyn Rapid Transit Co.

polished faces of the lenses being fused. The lenses are placed on small placques, four per placque, and each placque is covered with a vitreous enameled-steel square cup and fed automatically through the furnace chamber and discharged into an annealing lehr. The furnace chamber is arranged in four sections, each maintained at a different temperature, and the annealing lehr is 60 ft. long.

When the work was carried on originally through gas-fired furnaces the loss was approximately 20%, whereas the average loss now is only 3 or 4% with electrically heated ovens.

Tests have been made to determine the practicability of using an electric furnace for the production of vitreous-enamel kitchen ware. A total of 36 miscellaneous pieces were fired in the furnace and a careful inspection showed that the results were satisfactory as to polish, absence of pitting and general smoothness. Due to the ease with which a definite temperature could be maintained it was an easy matter to secure results of the highest order with but little attention.

Due to the fact that no combustible gases are generated in the electric furnace no stacks are required, therefore the efficiency is much higher than furnaces of the combustion type. Likewise there is no escaping gas, no odor and no smoke from the electric furnace. At an installation made in a tool room, superseding four fuel-oil furnaces with electric furnaces, it was found necessary to install steam radiators in the room for the comfort of the employes who had difficulty in keeping cool even during the coldest weather when operating the fuel-fired furnaces.

ECONOMICAL METHOD OF CHARGING STORAGE BATTERIES.

Increased Generator Capacity Obtained by Use of Booster Machine on Same Shaft as That of Main Generator—Method Simple in Operation.

Storage batteries before they are ready to leave the factory are subjected to a number of long charges and discharges in order to properly form the plates, after which they are given a final charge. This requires a considerable amount of energy and usually forms an important item in the cost of manufacture of the batteries.

At the Indianapolis plant of the Prest-O-Lite Co. this energy is furnished through synchronous-motor-generator sets converting the energy from 4100-volt three-phase alternating current to 250-volt direct current. In Fig. 3 there are shown two 625-hp. and one 450-hp. Westinghouse machines installed in this plant. A 875-hp. machine will be installed shortly. The feature of this equipment is the use of three units for each machine, the third unit being used as a booster to allow the storage batteries to be discharged directly back into line.

The method of accomplishing this is shown in the accompanying diagram of connections, and can be understood by an explanation of operating conditions. For charging, batteries are connected across the 250-volt generator in the regular manner, the generator (Fig. 1) delivering 800 amperes for charging various batteries, each having a suitable charging rheostat connected in series therewith. If several other batteries are connected to the discharge circuit, the conditions exist as shown in Fig. 2. These batteries are connected in series with a booster which composes the third unit of the converting apparatus, it being a 100-volt direct-current machine. Assuming that the batteries on discharge deliver 200 amperes through a rheostat to the negative terminal of the booster and the voltage is thereby raised 100 volts, the batteries on discharge will develop approximately 150 volts, which with the

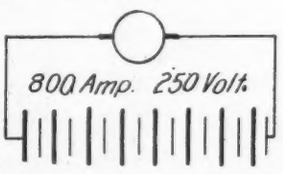


Fig. 1.—Diagram of Connections for Ordinary Charging of Storage Batteries.

100 volts developed by the booster causes the discharge circuit to deliver 200 amperes to the 250-volt bus. Therefore, with a current of 800 amperes in the batteries on charge only 600 amperes is delivered by the main generator because the discharge circuit is delivering 200 amperes to the charging circuit.

The main object of this booster is to increase

the capacity of the charging equipment; that is, with a standard motor-generator set the number of batteries which could be charged at one time would be limited to the capacity of the motor-generator set. With the addition of the boosting generator on the same shaft the effect is obtained of increased generator capacity. For

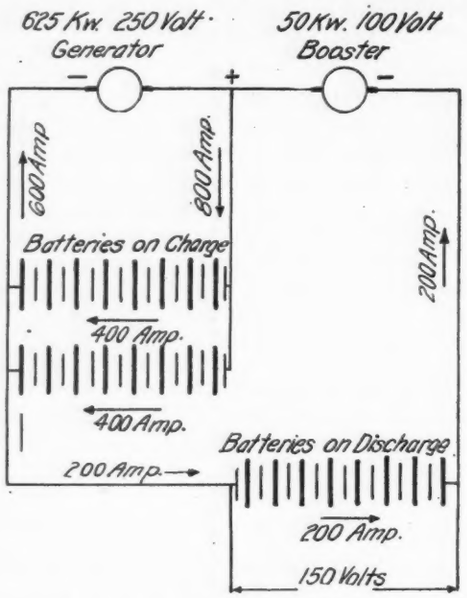


Fig. 2.—Method of Using Booster to Increase Capacity of Charging Generators.

instance, in Fig. 1 the 250-volt generator is delivering 800 amperes for charging or is producing 200 kw. Now if a 200-ampere 150-volt battery is placed on discharge 30 kw. are available. In this case, the generator will be required to deliver only 600 amperes, or 150 kw. However, to raise the voltage of the discharging circuit to 250, 200 amperes at 100 volts must be produced at the booster machine. This amounts to 20 kw. Therefore, the same number of batteries are charged with only 170 kw. being taken from the main source of supply, neglecting the losses in the machines.

In this plant the facilities for charging the batteries are comprehensive in principle but simple in operation. Each battery circuit is controlled through benchboard panels equipped with knife switches, rheostat handles and ammeters. On one side of the room there are 288 of these circuits and on the other side there are 180 circuits. Two operators can easily handle all of these circuits and thereby charge and discharge a great number of batteries at the same time. One of the interesting features of this charging equipment is the method of mounting the grid rheostats. On the side shown in Fig. 1, these rheostats are mounted nine in a row directly behind and on a level with the board. On the other side, however, there was not enough space for this kind of mounting so that some of the resistors had to be mounted above the top panel. This type of mounting preludes accessibility, but as in two years of operation there has been no need of repairs on the 288 circuits such facilities are thought unnecessary.

At the end of the room is the switchboard controlling the motor-generator sets. The 4100-volt energy enters through an oil switch and then goes to the main bus. The motor of the machines are connected directly to this bus through separate oil switches. No starting apparatus is necessary because the motors are designed to start as induction machines. On this switchboard are also contained the panels controlling the power circuits for the rest of the plant. All of the equipment on these boards is of Westinghouse manufacture.

Announcement has been made by H. S. Cooper, secretary of the Southwestern Electrical and Gas Association, that the 1921 convention of the organization will be held May 18-21 at Galveston, Tex., with headquarters at the Hotel Galvez.

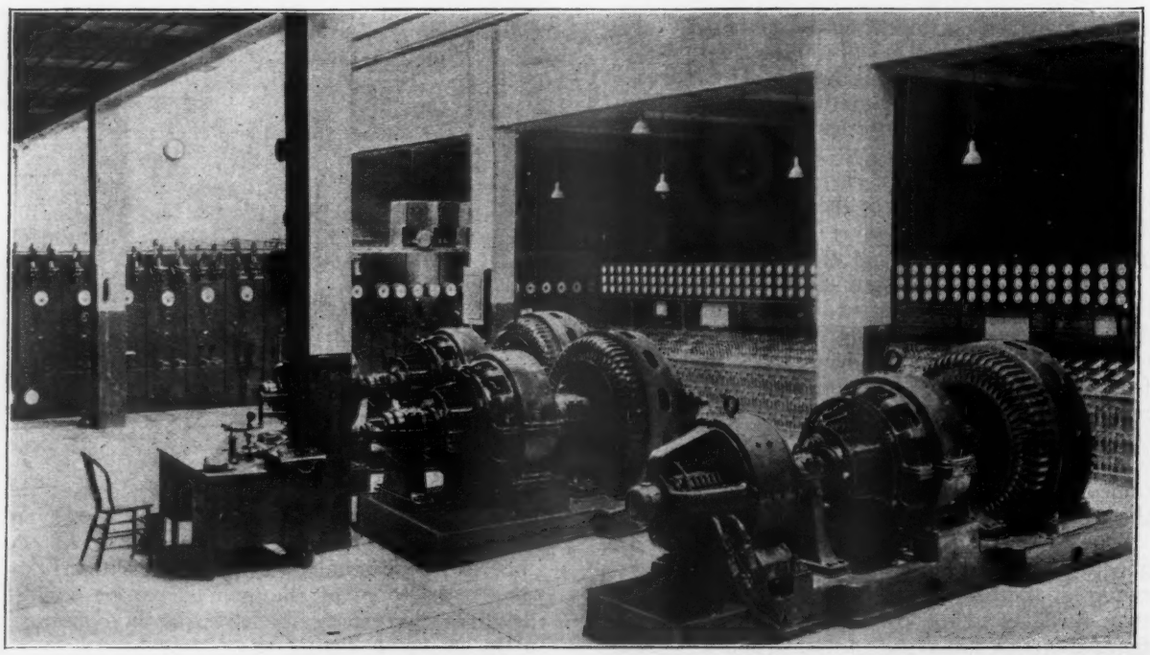


Fig. 3.—Synchronous-Motor-Generator Sets Installed in Prest-O-Lite Co. Plant for Charging Storage Batteries.

Manually Operated Alternating-Current Controllers

Simple Devices for Small Motors and Limited Control—Equipment Provides Speed Variations and Protection Against Overload and No-Voltage—Motors Accelerated Without Opening the Circuit

By G. J. KIRKGASSER and E. W. SEEGER

Alternating-Current Manually-Operated Controllers.—Various types of starters and speed regulating apparatus are made for single-phase and polyphase squirrel-cage and wound-roter motors. Those discussed in this chapter are of the manually operated types.

Starters for Single-Phase Motors.—Small-size single-phase motors are usually started by connecting them directly to the power line by means of a large-capacity snap switch, or an open or inclosed knife-blade switch.

For use with single-phase motors of 1hp. or over of the commutator self-starting type, a face-plate starter similar to that used with direct-current motors is used to some extent. It has a sliding arm with a spring at the hub to prevent it from remaining at an intermediate segment and to return it to the "off" position. The resistors are arranged to eliminate the effect of inductance, otherwise the power-factor during starting would be very low.

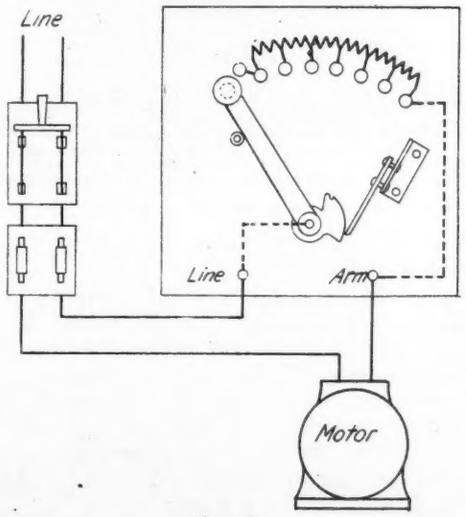


Fig. 70.

Connection diagram, showing small face-plate type primary-resistor starter used with single-phase motor.

It will be noted that the method of holding the lever in the "on" position is different from that employed on the d-c. starter where magnetism is used. On the a-c. starter a latch holds the lever which may be tripped when the supply voltage fails if a no-voltage release coil is provided. The connections for a simple starter of this kind without release is shown in Fig. 70.

Starters for Polyphase Induction Motors of Squirrel-Cage Type.—Since squirrel-cage motors have no commutator or brushes they are less damaged by a large starting current, although if of any appreciable size—5 or 10 hp. or more—the large surge affects the power lines, and power companies usually require the use of some starting apparatus to reduce this starting current.

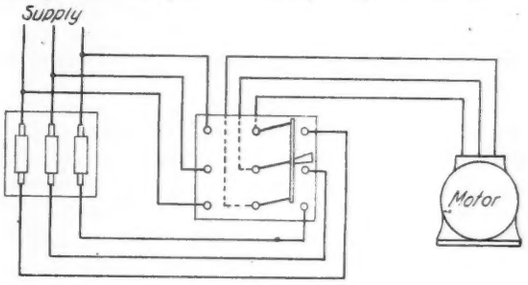


Fig. 71.

Double-throw knife switch used for connecting small polyphase motors "Across-the-Line." This is not good practice.

To connect a small polyphase motor to the line a 3 or 4-pole knife switch may be used, but since fuses of the capacity to protect the motors normally would be blown by the large starting currents (which are from five to eight times the normal running currents) a double-throw switch is used as shown in Fig. 71. Throwing the switch to the left connects the motor directly to the line, while after it is up to speed the switch is thrown to the right to connect the motor to the line, but with the fuses in circuit. In some cases larger fuses are placed in the starting side also.

The objection to this method is that the cir-

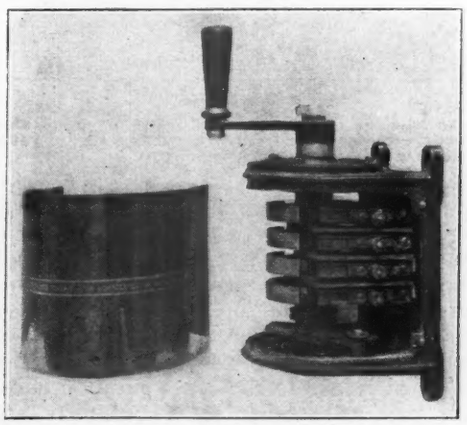


Fig. 72.

Small inclosed drum used for throwing small squirrel-cage motors "Across-the-Line." Fingers are carried on both sides so that the motor may be started in either direction.

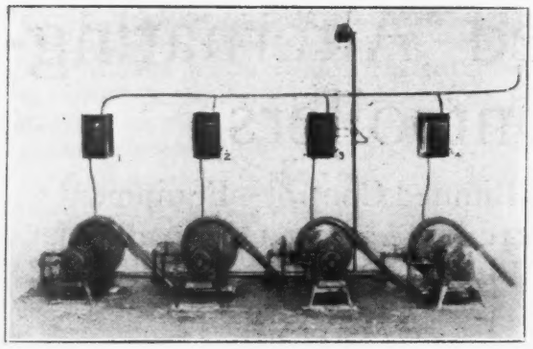


Fig. 73.

Four inclosed-type squirrel-cage motor starters used in connection with 3-hp. motors driving centrifugal compressors.

cuit to the motor is entirely opened during the throw-over, and the repeated breaking of the circuit draws arcs and damages the switch blades and contact clips. Knife switches do not stand this service and, being exposed, are objected to in some localities.

Small drum-type switches with the fingers immersed in oil are better adapted to such service than open knife switches. They perform the same functions as the double-throw knife switch, but are entirely inclosed. The oil prevents the maintenance of an arc and preserves the fingers and contacts. With standard squirrel-cage motors, where power companies do not object, they may be used with motors of 7.5 hp., 110 volts; 15 hp., 220 volts, and 20 hp., 440 and 550 volts. Because of the simplicity of squirrel-cage motors some power companies allow still larger sizes to be thrown on the line without special starting equipment. High-torque motors, because of their lower starting current, may be used in larger capacities without special starting equipment.

Another inclosed starting switch for use with

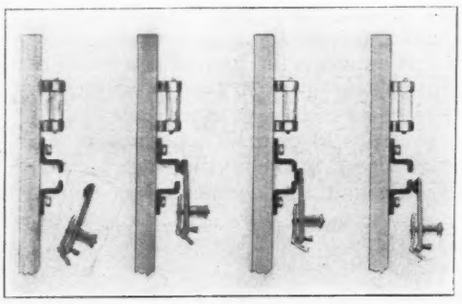


Fig. 74.

Shows how the Cutler-Hammer inclosed type of starter changes the motor over from the starting to the running connection without breaking the circuit.

motors up to 5-hp. capacity has a design which changes over from the starting to the running position without opening the circuit to the motor.

The operation is by means of a handle on the exterior, which in the "up" position connects the motor directly to the line. It is held "up" while the motor accelerates, and on being released, automatically falls to the lower position and the fingers pass to another set of contacts which bring the fuses into circuit. A no-voltage release throws the fingers to the "open" position if the power supply fails.

Fig. 74 shows how the operation takes place and how current is carried to the motor. For emergency stopping, or where it is desired to have control of the stopping of the motor from a remote location, or from several points, connection can be made to the no-voltage release so that this circuit can be opened, causing the starter to disconnect the motor from the line.

As a protective feature important in industrial plants there is an interlocking device which cuts off all current when the front panel is lowered to inspect or renew fuses. When in this

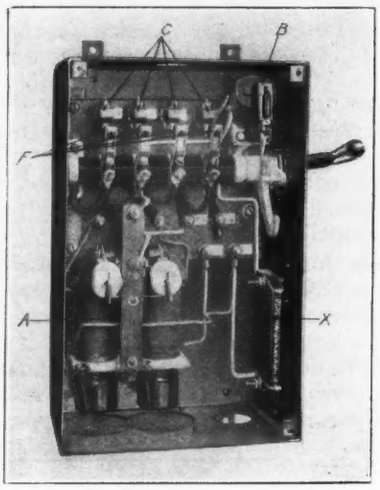


Fig. 75.

Showing interior of manually operated a-c. starter with inverse-time-limit overload relays mounted in the same case with the switch mechanism. "A" is the overload relay; "B" is the low-voltage release; "CCCC" are the stationary contacts; "FFFF" are the fingers, and "x" is a flat resistance unit which is connected in circuit with the release coil to reduce the amount of current flowing in it.

position the operating handle cannot be moved to the "on" position.

In place of fuses this type of starter, as well as others, may have incorporated in the design, or as an additional feature, an inverse time-limit overload movement which does not allow an overload to continue for a period that would cause damage to the motor. It does not open the circuit because of the brief but large starting current, nor because of the short overload which is frequently imposed on a motor.

Where a relay of the type allowing an overload for a few moments replaces the fuses it is not necessary to cut the relay out of service for starting, and but one set of contacts is required.

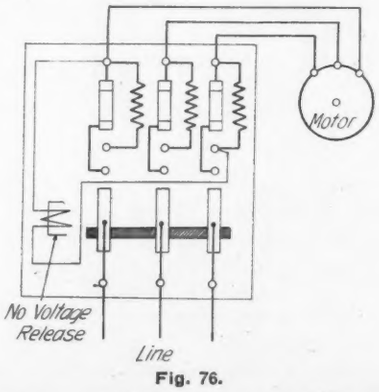


Fig. 76.

Diagram of connection for a starter which introduces steps of resistance in the primary circuit during the starting period.

When the fingers are closed by the exterior handle the motor is connected directly to the line, the controller being similar to a multiple knife switch, but designed for carrying and breaking the currents without a great deal of wear and being mechanically constructed to withstand frequent operation. A 2-phase 4-wire inclosed starter is shown in Fig. 75.

Still another variation is a type of starter which reduces the impressed voltage and, therefore, reduces the starting current to about three times the normal running current. The reduction

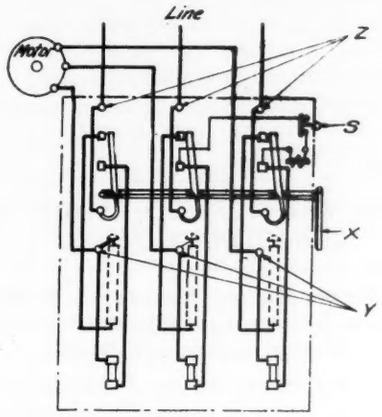


Fig. 77.

Connection for 3-phase, 3-wire, primary-resistance starter using compression-type resistors.

is accomplished through the connection of one step of resistance in each phase of the motor circuit when the operating handle is in the "Starting" position.

This, of course, reduces the starting torque somewhat, but since the initial current is decreased such starters are recommended by power companies. In the running position the motor is connected directly to the line, and a slight pressure on the handle throws the contacts open and disconnects the motor. This is readily seen by tracing the connections in Fig. 76.

Connections for 2-phase 4-wire and a 3-phase 3-wire primary-resistance starter, using compression-type resistors, are shown in Figs. 77 and 78. One has overload relays and the other fuse protection.

In the drawings the resistors are indicated by

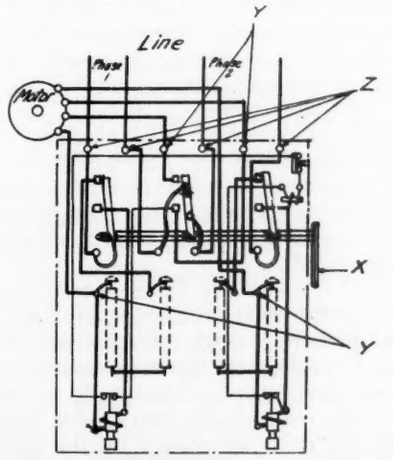


Fig. 78.

Connection for a 2-phase, 4-wire, primary-resistance starter using compression-type resistors and with overload relays in place of fuses.

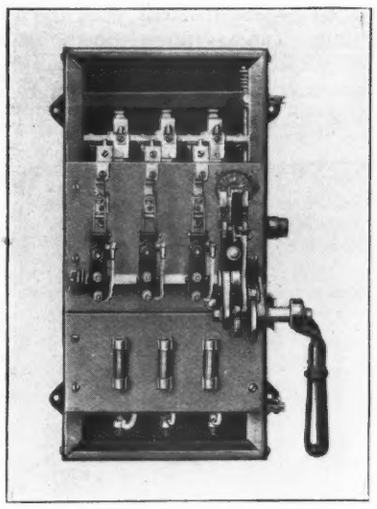


Fig. 79.

Allen-Bradley primary resistance starter for use with squirrel-cage motors having compression-type resistors.

the dotted-line tubes, and in the illustration of this class of starter (Fig. 79) the lower terminals of the resistors are seen at the bottom extending below the slate panel carrying the fuses.

For starting squirrel-cage motors of over 7.5 or 10-hp. capacity the auto-transformer starter is generally used. This is inclosed, with an operating handle on the outside moving to "start," "run" and "off" positions. The exterior appearance of two makes is indicated in Figs. 80 and 81.

The theory on which this type of starter is based involves the stepping down of the voltage applied to the motor, with a commutation or cir-

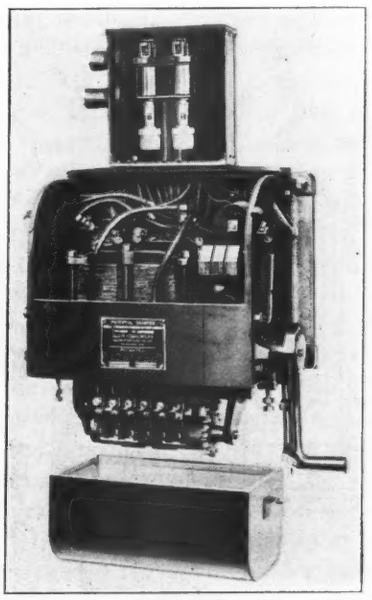


Fig. 80.

Allis-Chalmers auto-transformer type of starter for squirrel-cage motors. Overload relays are mounted above the starter. Cover and oil case removed to show mechanism.

cuit making and breaking mechanism. The reduction of the impressed voltage to the motor decreases the starting torque, so that in commercial practice as near normal impressed volt-

age is selected as is consistent with the allowable initial current. Taps arranged on the transformer coils, on which the percentage of voltage reductions are marked, are brought out to provide for choosing the desired connections. The stand-

Fig. 81.
Showing auto-transformer starter with oil case and cover in place.

ard tap is the one which supplies 65% of line voltage to the primary of the motor, but 50% and 80% taps are also provided.

When the control lever is brought toward the operator into the "start" position the motor is supplied with the percentage of line voltage depending upon the tap on the transformer coil that has been selected. To guard against slowing down of the motor, when changing over from this low voltage to the line voltage, the mechanism is so designed that a quick throw to the extreme position away from the operator is necessary. An interlock also makes impossible the throwing of the lever to this running position

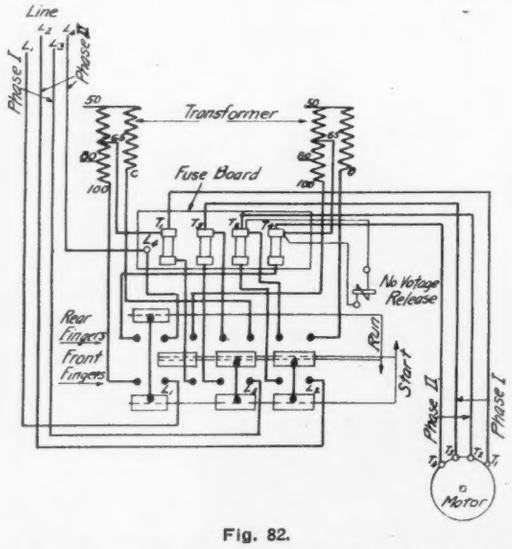


Fig. 82.
Connections for auto-transformer type of starter for a 2-phase, 4-wire, squirrel-cage motor.

directly. To get to this position the lever must first be moved into the starting position.

As with other devices used for starting squirrel-cage motors, the fuses or overload relays used with or incorporated in the auto-transformer starter are not usually connected in circuit during the starting period. Overload-release relays of the inverse-time-limit type have replaced fuses to a great extent during recent years for three chief reasons. First, they save the trouble and expense of renewing fuses; second, they allow for overloads of a little longer duration (to which all motors may be subjected) but still protect against injury, and third, and most important, they provide protection against running on single-phase supply. If one fuse is defective, or becomes overheated because of poor terminal connections, it may blow, but with two of three fuses still intact the polyphase motor will continue to run single-phase, but greatly overloaded. Theoretically fuses should give this same protection, but using large-capacity fuses is such a general practice to avoid the nuisance and expense of renewing them that the protection feature is sacrificed.

PUBLIC SERVICE CO. ADDS MANY NEW STOCKHOLDERS.

Annual Report Shows Increase of $2,328,861 in Operating Revenue and Substantial Growth in Number of Customers Served.

The annual report of the Public Service Co of Northern Illinois, extract from which appeared on page 410 of the March 5 issue of ELECTRICAL REVIEW, shows that the company's operating revenue from electricity, gas, water and heating for the year 1920 showed an increase of $2,328,861 over the year 1919. This is the largest increase in the business in the history of the company and while it reflects the increase in rates which became effective Aug. 1 (though the company did not receive the full benefit of it until Sept. 1) the major portion of the increase was the result of the continued growth of the business.

The increase in the number of customers is shown in the following table:

	Number of customers.		
Class of service.	1920.	1919.	1918.
Electricity	106,305	96,783	88,012
Gas	71,164	68,339	66,295
Water	6,018	6,064	5,954
Heat	1,122	1,297	1,272

The report describes the extensions and additions to its system, the new substations and new transmission lines completed, including those made necessary by the demands of large customers connected on during the year. It states the company contemplates an extensive enlargement of its plant capacity to provide for rapidly increasing requirements. The company's financial operations during the year are sketched and there is a section devoted to a description of the relationship between the management and employes, the Co-operative Council and the group insurance system.

The institution of the Investment Department is treated in the report which relates that 23,280 shares of preferred stock offered customers have been sold. At the time the stock was first offered there were 2455 stockholders. As a result of the sale 2000 new stockholders were added and when all the stock purchased on the installment plan is paid for the total number of the company's stockholders will have increased to approximately 13,000.

EDITORIAL COMMENT

Competitive Bidding

With the resumption of building activities many electrical contractors will be sorely tempted to revert to former unbusinesslike and unprofitable habits. Prominent among these former habits is the fallacy of submitting bids to large builders at prices far too low with the expectation that such bids will secure the builder's future work, and the loss incurred on this job will be made up on later ones.

Quite the reverse usually happens. Few successful builders let contracts without getting competitive bids, although they may favor certain contractors. However, such favoritism is usually the result of exceptionally good work rather than low bids. The builder usually forms a fairly close estimate of what the electrical work should cost, and when a contractor submits a low estimate for one job and follows this with an extra-high bid for the next it invariably results in the contractor finding more competition on the second job than on the first. In any event the builder will question the contractor's reliability and the quality of his work.

The good graces of a large builder are, no doubt, a great asset to the electrical contractor, but, if they are to be kept, should be secured by the quality of the work done and the service rendered rather than by underbidding.

An electrical contractor in a Western city has given practical evidence of his sincerity in respect to the evils of competitive bidding by adopting a policy of disregarding absolutely all prospective orders in which price is a feature.

"What's the use of doing work just to keep busy?" he asks. "I have made plenty of money on competitive work and good-sized contracts, but since so many contractors have been bidding low just to keep busy, there has been no money in such jobs. Naturally a job taken at a low competitive price can't be given the service that should go into it, if the bidder expects to get out whole, and self-respecting contractors aren't going to slight a job, even though they have to skim close to the price of doing it. There are enough builders and architects who look first to service to keep me going, men who know they will get honest value for the money they pay for electrical service. In the long run I will have a larger net profit, and perhaps a better reputation, even if I don't do quite so large a volume of this class of business.

"And I will not feel that I am helping to demoralize the electrical industry by acting in this manner."

These remarks deserve and can be given wide application.

About Old Dogs and New Tricks

Teaching salesmanship to a natural-born salesman would seem at first thought a waste of effort, or a presumption similar to that of a spinster's advice on the care of children. Yet the better and more experienced salesmen are constantly on the alert for new "slants" to the business of selling. They are the most devoted students of salesmanship because, while believing that everything has been said that can possibly be said about the art of salesmanship, they occasionally find fresh inspiration in an old thought clothed in a new dress. They do not believe in the old adage that says "You can't teach an old dog new tricks," for they feel they have learned a new trick every time they read a book or an article on salesmanship, or hear at a sales school the application of an old idea couched in newer, more convincing terms. They seem to be "never too old to learn."

The old English gentleman who sought to convey the impression that trying to sell goods in an overstocked market was like "Carrying coals to Newcastle," where the chief industry was that of coal mining, would not find favor in a modern American school of salesmanship. The modern Yankee salesman can select **a** special grade of American coal and sell it in Newcastle, England, to a modern manufacturer who cannot find the desired quality or efficiency for his purpose in the coal mined at his door.

Salesmanship, as all salesmen know, is the modern development of the oldest business dealing in the world—the barter of one commodity for another—instinctively evolved by the founders of the human race when one husbandman with perhaps more goats than he reasonably needed, traded one for an armful of fig leaves gathered from afar by another. The owner of the goats needed the fig leaves for clothing and the gatherer of fig leaves needed the goat for food. After the invention of the first substance that became legal tender, or money, real salesmanship must have begun to develop along the lines leading to its present efficient system. So, after all, salesmanship is only the art of supplying a demand, but with that art so highly refined that

the real salesman now has the faculty of first creating the desire and then supplying that demand born of his professional efforts.

It is this highly refined type of salesmanship that is now awakening in the minds of all our people a desire for the application of electricity to all phases of home life as well as industry. The public is already fairly well convinced of the efficiency and economy of electricity. It only remains for the highly specialized salesman to take each case and treat it individually so that every labor saving household appliance not only stays sold, but acts as a silent demonstrator for the sale of others.

It is in the electrical business, more than any other at the present time, that the old salesman with all his old tricks and experience finds it necessary, and actually does, learn new tricks of his profession. Many of these new "slants" he obtains in sales schools conducted without cost to him by manufacturers of appliances.

Electrical Merchants for Electrical Goods

Probably a large majority of electrical contractors carry supplies of electrical equipment for sale, and many of them also have stocks of appliances and lighting fixtures. This is especially true in the smaller cities where the contractor aims to be the electrical headquarters of the community and supply all electrical needs. Too often, however, the contractor has had little training or experience as a merchant, and fails to meet all the requirements of successful merchandising.

It is highly desirable that the electrical dealer should keep this trade in his own hands and not let it pass to the department store, the general store, the drug store, or any other agency poorly informed as to electrical requirements. Electrical goods should, for the good of the industry and the public, be handled by those familiar with electrical conditions. This issue contains some valuable suggestions for the electrical dealer as to how to meet such competition, which exists everywhere in either an active or potential form and which is more likely to spring up as the use of electrical appliances becomes more and more general. By adopting enterprising and modern merchandising methods and properly serving this trade there is no good reason why it should not be held by the purely electrical dealer who specializes in this line, for he can offer a service which is always lacking where other merchants attempt to handle such goods. The expert knowledge of the specialist is peculiarly valuable in reference to electrical merchandise, and every community should have the full benefit of it.

The market that exists for the sale of electrical appliances can be divided into two parts, according to the terms of the sale—the cash market and the installment market. Of the two, the cash market probably is the smaller. Accordingly, if an electrical dealer does business only on a cash basis sales are restricted. This, in turn, means that the market for the consumption of electrical energy is correspondingly restricted.

Credit selling is a method of obtaining market expansion for both the electrical dealer and the central station. Many electrical dealers fear to take the risks involved in credit selling. Others lack the capital necessary to finance such selling.

The electrical industry is peculiarly well qualified to engage in installment selling. Everyone using electricity for any purpose, except in the case of isolated plants, is on the books of the central-station companies, which know their customers as credit risks and which can assure the payment of bills by refusing to furnish additional service. Most prospective customers for appliances are on their books. Their accounts must be carried, and any additional items included in these accounts mean but little more work or expense.

Central-station companies, therefore, are in an excellent position to do a credit appliance business, adding the installments to the customers' monthly bills. They are also in a position to carry and collect the accounts of local electrical dealers. Such arrangements will open up the full market for the sale of electrical appliances. People will be able to buy on credit from the many electrical stores. Each individual electrical dealer would then have a larger market, and it would give him more reason to intensify his merchandising activities. The necessity of dealers keeping credit accounts would be eliminated. An increased market for the sale of electrical energy would be secured for the central-station companies, and that alone would undoubtedly justify their action in assuming credit risks for the dealers.

Industrial Haulage

Central stations will do well to give more serious consideration than they have in the past to the use of electricity in industrial haulage. There are unlimited possibilities for the electric truck and tractor, and an increasing number of manufacturers are realizing their economies. Whether the tremendous battery-charging load that will develop comes to the central station or is handled by isolated charging plants depends very largely on the interest taken by utilities in this field; but, at any rate, an increasing quantity of energy will be consumed for electric haulage.

THE WEEK'S NEWS

Reports of Important Meetings, Developments and Other Happenings of the Electrical Industry and Its Allied Interests

PROSPERITY PENDULUM GATHERING MOMENTUM.

Achievements of Association Pointed Out as Basis for Optimism by President Kerlin at Electrical Supplies Meeting.

The consensus of opinion among the manufacturers represented at the sixth annual meeting of the Associated Manufacturers of Electrical Supplies, held at the Hotel Biltmore, New York City, March 15, was that quality should be maintained; that price reductions would have no material effect in stimulating business, and that unless a fair profit could be secured it would be better to wait for the orders which were sure to come.

President J. F. Kerlin in reviewing the past year characterized it as a period the like of which was unknown heretofore, with every member of the Association during the first 6 mo. forcing production to the maximum while throughout the last half of the year, business was almost at a standstill. "The pendulum of prosperity in its great outward swing apparently went too far—struck something and came back with a terrific rebound. It is still quivering and somewhat unsteady from the shock, but now gathering momentum for another forward swing which is sure to come as day follows night."

Continuing Mr. Kerlin called attention to the greatly increased demand for electricity since the war due to the public having learned of its practicability, power, safety and comfort, and the constructive attitude of the people towards the electric public utilities. In presenting grounds for a feeling of optimism he cited the achievements of the Association which included the elimination of waste by standardization, and the development of a cost system which enables members to determine accurately and definitely production costs before offering an article for sale. The question of safety has been studied in co-operation with other bodies and a great deal has been learned about our raw materials with a resultant improvement in quality. Moreover, the Association has improved its merchandising methods, solved numerous traffic problems and increased the efficiency of its credit systems and they mean considerable in the primary cost of the product.

Need for Uniform Cost Accounting System Demonstrated.

In conclusion, President Kerlin declared that the Association had proved its worth, was here to stay and, notwithstanding its great accomplishments of the past, there was still much work to be done. A more universal standardization and a more general and closer co-operation in the matter of costs will be found desirable, if not necessary, for members to keep abreast with the rapid changes in economic conditions. The Association should strive toward a concentration of effort or consolidation of some organizations with which it is affiliated so as to eliminate to some extent the apparent duplication of purposes.

The report of Charles E. Dustin, general secretary, emphasized the correct basis upon which the Association had been formed 6 yrs. ago by showing only slight changes since its organization. He said that much had been accomplished by the Association in the compiling of records of production costs and supplying the information to the members in comparison forms. These comparison forms had led to the discovery of differences ranging from 25 to 40%, and clearly demonstrated the urgent need of a uniform cost accounting system.

In presenting the report of his activities as the Association's representative to the National Fire Protection Association, H. R. Sargent said it had been proposed that the American Engineering Standards Committee adopt the National Electrical Code, but since such adoption would permit of the Code's revision only once every 3 yrs., the suggestion was discarded. Mr. Sargent commented on the many advantages in clarity and ease of application a simplified code recently brought out by Portland, Ore., had over the present code, and it was decided that the Association appoint a committee to study this new code with the view of modifying the present code to conform to it.

The report of the tariff committee, rendered by William Burgess, proved to be of great interest since many electrical manufacturers did not realize the protection they were receiving because the present tariff does not cover electrical goods by name. The metal schedule, under which electrical apparatus has been classified, gave a protection of 45% up to 1914, but the passage of the Underwood bill that year reduced it to 20%. While in recent years there has been no importation of foreign-made electrical apparatus, a resumption may be expected at any time and under the reduced tariff and depreciated value of foreign exchanges American manufacturers would be seriously handicapped. Therefore the Ways and Means Committee at Washington is working on a revision for better protection of American manufacturers. It is proposed to assess tariff payments on the United States value rather than the value in the original exporting country, and this would result in German-made goods being taxed 25% instead of 7%.

At the conclusion of Mr. Burgess' report the following resolution was adopted and a copy sent to President Harding, Senator Penrose and Representative Fordney of the Ways and Means Committee in Washington: "Resolved, that this meeting approves the proposition that the tariff payments shall be assessed in United States

values instead of the value in the country of origin."

The following members were elected to fill the positions on the board of governors of those whose term expired by limitation. S. H. Blake, General Electric Co., Schenectady, N. Y.; A. H. Englund, Electric Service Supplies Co., Philadelphia; F. L. Bishop, Hartford Faience Co., Hartford, Conn.; A. F. Hills, Crouse-Hinds Co., Syracuse, N. Y., and Robert Kuhn, American Electrical Heater Co., Detroit.

The officers elected for the ensuing year were: President, Shiras Morris, Hart & Hegeman Manufacturing Co., Hartford, Conn.; vice-president, W. H. Thornley, Tubular Woven Fabric Co., Pawtucket, R. I.; treasurer, J. W. Perry, H. W. Johns-Manville Co., New York City, and general secretary, Charles E. Dustin, New York City.

Before adjournment suitable resolutions expressing sorrow on the recent death of Edward B. Hatch, of Hartford, Conn., a charter member of the Association and a member of the Board of Governors, were adopted and an engrossed copy ordered sent to his family.

I. E. S. ADOPTS RESOLUTION ON LIGHTING FIXTURES.

At the meeting of the Council of the Illuminating Enginering Society held March 10 the following resolution on the standardization of lighting fixtures was adopted:

Whereas, in the opinion of the Council of the Illuminating Engineering Society the project for rendering lighting fixtures readily removable by the employment of suitable electric attachments, as discussed at the January meeting of the New York Section of this Society, offers potentiality for large improvement in lighting conditions, and

Whereas, realization of the potential value of this project is contingent upon such standardization as will make the electric attachments of fixtures completely interchangeable, and

Whereas, failure to so standardize attachments would jeopardize the success of the project entailing untold inconvenience and confusion to the public, be it therefore

Resolved, that in the best interests of the public and of the lighting industry, the Council hereby urges all concerned to co-operate to the fullest extent in bringing about complete interchangeability of removable lighting fixtures.

The annual convention of the Society will be held in Rochester, N. Y., during the week of Sept. 26. Robert M. Searle, vice-president of the Rochester Gas & Electric Corp., has been appointed chairman of the General Committee of the 1921 Convention.

PROGRAM FOR MISSOURI PUBLIC UTILITIES MEETING.

The Missouri Association of Public Utilities will hold its annual convention in Kansas City, Mo., April 21-23, during the week of the Kansas City Electrical Show. The program arranged for the convention follows: Papers on "Methods of Valuation and Rate of Return of Public Utilities," by R. A. Brown, attorney for the St. Joseph (Mo.) Railway, Light, Heat & Power Co.; "The Training and Handling of Public Utility Employes," by speaker to be announced; "The Indeterminate Franchise," by J. W. Dana, attorney for the Kansas City Gas Co.; "Relation of the College to the Industry," by E. J. McCaustland, dean and director of the School of Engineering, Universtiy of Missouri; "Transmission Line Cost and Development and Determining Rates and Minimum Charges," by N. T. Wilcox, Mississippi River Power Co., Keokuk, Ia., and "Concentration of Generating Equipment at Centers of Economic Production and Transmission," by H. H. Kuhn, Kansas City Power & Light Co.

DISCUSS TOPIC OF HOW TO SELL THE CONTRACTOR.

Report of Investigation of Recording Systems Employed in Various Departments of Electrical Supply Houses Submitted to Jobbers.

The regular quarterly meeting of the Atlantic Division of the Electrical Supply Jobbers Association held March 15 at the Hotel Commodore, New York City, was presided over by E. W. Rockafellow, Western Electric Co., pending the election of a successor to chairman A. M. Little, resigned.

At the morning meeting W. I. Bickford, Iron City Electric Co., in his paper on "Necessity for Maintaining Stocks for Service Under All Conditions" pointed out the dangers in permitting stocks to become exhausted or run low, due to inability to replace quickly when the demand comes and the chances of sending the customer elsewhere. Secretary E. Donald Tolles gave a report on his investigation of 31 recording systems employed in the receiving, shipping and billing departments of large electrical supply houses, and described the demonstration of the Gilman fanfold system for such businesses. It was decided to continue the investigation.

In the afternoon W. L. Goodwin, assistant to the president of the Society for Electrical Development, made a forceful appeal for support of the Society by all branches of the industry and urged that all seriously consider becoming members. Mr. Goodwin also spoke about the need of more publicity on what the jobbers' association is doing.

Charles L. Eidlitz, president of R. B. Corey Co., in presenting the subject of "How to Sell the Contractor" contended that the jobber salesman doesn't speak the language of the contractor, nor know what materials he needs for certain work, or in what quantities. Electrical materials are divided into nine classes, namely mechanical; current transmitting; contact making and breaking; insulating; resistance; magnetic; magnetically operated; induction and chemical. The actual estimates on four recent electrical contracts were cited as typical examples showing that at least 90% of the material required on the average job comes under the first three classifications. Therefore the salesman needs to be only thoroughly familiar with these goods. It was further shown that every contact-making and breaking device was either a knife switch or a screw shell, or a combination of the two. Mr. Eidlitz in speaking on present business conditions gave a logical presentation of the different stages, or cycles, through which business passes.

In the executive session Fred E. Stow, H. C. Roberts Electrical Supply Co., Philadelphia, was

elected chairman of the Atlantic Division to serve until July 1.

At a meeting of the executive committee of the Electrical Supply Jobbers' Association in Cleveland March 16, E. Donald Tolles, secretary of the Atlantic Division, was appointed national representative, and also authorized to undertake the investigation of recording systems for large electrical supply houses for the national body. Mr. Tolles in his new capacity will act as publicity director and spokesman for the Association.

ELECTRICAL ASSOCIATION HOLDS CONVENTION IN MILWAUKEE.

Interesting Features of Inspection Trip Through the New Lakeside Powdered-Coal Plant Described Briefly.

The thirteenth annual convention of the Wisconsin Electrical Association opened at the Hotel Pfister, Milwaukee, March 22, in joint session with the Wisconsin Gas Association. The Milwaukee Electric Railway & Light Co. kindly consented to permit an examination of their Lakeside generating station, and on Tuesday about 100 delegates made the trip by a special train placed at their disposal by the company. About 20 members of the engineering staff, headed by John Anderson, chief engineer and designer of the plant, conducted the party which made a complete tour, commencing at the car dumping machine and following the progress of the fuel by way of the conveyors until it had been transformed into electrical energy at 13,200 volts in the 20,000-kw. General Electric turbogenerator.

The Lakewood plant is, indeed, a very comprehensive undertaking, and too much credit cannot be given Mr. Anderson, and necessarily the company in its faith in him, as the installation represents a most daring departure from the path of approved methods. The plant is as yet uncompleted, one unit only being in operation. But sufficient experience has already been gained to predict an unqualified success.

At this time no attempt will be made to give the comprehensive description which is warranted by this giant powdered-coal-consuming pioneer in the central-station field, but this plant will be made the subject of a carefully prepared article to appear at a later date. This article will be full and complete, giving all of the essential engineering facts and details of construction from the time the coal is dumped bodily from a gondola car into the concrete and steel receiving bunkers, flowing through the preliminary crushers, then to the secondary storage above the pulverizers and finally to the furnaces where, in a veritable cataract of fire it is transformed into gaseous fuel and completely and efficiently consumed.

Plant Designed to Permit Future Extensions by Unit Additions.

The plant has been designed for the immediate installation of two units of 20,000 kw. each, with provision for indefinite extensions, by simply adding the necessary floor space to accommodate the additional units. The coal-receiving facilities will not be taxed for many years to come.

The Lakewood plant is the first large power station to be operated exclusively on powdered coal. That this plant is successfully demonstrating the practicability of this ideal fuel there seems not to be the shadow of a doubt. There will come a day, and that not far distant, when Chief Anderson may open the plant doors wide and bid all to enter who will with the complete assurance that here they will find no consumable portion of the coal wasted.

And what is more, through the liberal co-operative spirit of Chief Anderson and his company in conjunction with the fuel experts of the Combustion Engineering Co. and the Bureau of Mines at Washington, headed by that nationally well-known combustion expert, H. Kreisinger, for 20 years with the bureau, there will be solved other vexatious and all-important furnace problems.

In the face of fuel shortages which are constantly with us, and the need for fuel conservation, it is indeed gratifying to find such a work being carried on. Its success, and there can be no doubt of this means much to the welfare of the country.

The complete story of this plant will, indeed, mark a milestone in the history of power-plant construction.

Features of the following sessions of the convention will be covered in next week's issue of Electrical Review.

DAVENPORT DEALERS TO ORGANIZE.

Electrical contractors and dealers of Davenport, Ia., held a meeting recently, at which steps were taken towards the organization of the Davenport Electrical Club. George W. Hill, representative of the Iowa State Association of Electrical Contractors and Dealers, presented his views on the needs of such a club in Davenport, and short talks were made by F. T. Turner and C. N. Chubb.

MERCHANDISING METHODS THEME OF CHICAGO MEETING.

W. L. Goodwin Points Out Function of Manufacturers and Jobbers at Meeting of American Washing Machine Manufacturers.

Merchandising methods were discussed at the meeting of the American Washing Machine Manufacturers' Association held in Chicago last week. The subject was introduced by W. L. Goodwin, assistant to the president of the Society for Electrical Development, who stated that in the merchandising of washing machines there is a distinct jobbers' function which must be performed; it can be done either through a legitimate jobber, or it can be performed by the manufacturer himself, but somewhere in the process the jobbers' function is actually done. He also stated that there was much need on the part of the average washing machine dealer to acquaint himself with washing processes in order to sell the machine intelligently. A large percentage of service costs is a result of ignorant selling, and too much time is spent in educating the woman customer in the machinery rather than the washing process. Mr. Goodwin further said that it is useless to force the present market by cutting prices.

W. B. Henri, Chicago, stated that one of the most important items to be considered in mer-

chandising methods is that of turnover, and for every dollar spent in putting goods on the dealer's floor a dollar should be spent to move them by advertising, etc. He believed that by building up a sales organization and getting a real "out-on-the road" sales manager some good results could be accomplished. It is not enough to merely make a machine and put a price on it; a real selling service for the trade must be performed. Advertising is essential, he continued, as the washing machine manufacturer is competing for the housewife's dollars with many other household products.

The next meeting of the Association will be held at the Sherman Hotel, Chicago, May 18-19.

CHICAGO ELECTRIC CLUB HEARS A TALK ON COAL.

This Country Favored Above Others in Supply of Fuel That May Be Mined With Relatively Little Effort.

W. L. Abbott, chief operating engineer of the Commonwealth Edison Co., gave an interesting and instructive talk on the history and future of coal at the March 22 noon meeting of the Chicago Electric Club. Mr. Abbott traced briefly the steps involved in the formation of coal, showing how conditions had been favorable to such formation in the distant past, and then sketched briefly the quantities and general location of the existing supply of coal available for human use. At the present rate of use it was shown that our available coal supply would last for possibly 1000 yrs., but at a rate of use increasing in accordance with present and past rates of increase all such fuel will be used up in about 200 yrs.

Attention was called to the fact that probably twice as much coal would be available for use if coal operators could be required or induced in some manner to take out the entire quantity of fuel in the veins actualy worked. However, it was pointed out that it was impossible for the operators to carry on their work in such a manner as to take out all the available supply without slightly increasing the cost of operations. This increased cost would be sufficient to impose a severe burden upon any few operators undertaking such an enterprise if, in fact, it did not actually destroy their business. Mr. Abbott feels that some means should be found to provide for the removal of all good fuel in any veins that are opened up and worked.

TO HOLD ELECTRICAL CONFERENCE AT SPRINGFIELD, MASS.

There will be held March 30 at Springfield, Mass., an electrical conference under the auspices of the Western New England Association of Electrical Inspectors. This conference will be for all who may desire to attend, especially the central station, electrical contracting and manufacturing interests, wiremen, fire and accident insurance inspectors, and any engaged in the installation or use of electrical equipment of any character.

The program provides for the discussion of the following subjects: "Should Metal Conduits Be a Mandatory Requirement Where They Will Be Subjected to the Fumes of Animal Waste Matter, Steam Vapors, Drippings in Fish-Packing Plants, Under Soda Water Fountains or Ice Cream Counters, Where There Is Salt Spray, or in Permanently Damp Places?" "The Enclosure of Fuses and Switches," and an explanation of Rule 15A of the 1920 issue of the National Electrical Code and its economic value.

COMING CONVENTIONS.

Kansas City Electrical Show. First annual electrical exposition, Convention Hall, Kansas City, Mo., April 18-23. Manager, Sam Furst, Electrical Trades Exposition Co., 802 Broadway, Kansas City, Mo.

American Electrochemical Society. Spring meeting, Atlantic City, N. J., April 21-23. Headquarters, Hotel Chalfonte. Secretary, Joseph W. Richards, Lehigh University, Bethlehem, Pa.

Missouri Association of Public Utilities. Annual convention, Kansas City, Mo., April 21-23. Secretary, F. D. Beardslee, 1500 Grand Avenue, Kansas City, Mo.

American Washing Machine Manufacturers' Association. Meeting at Sherman Hotel, Chicago, May 18-19. Secretary, Enoch B. Seitz, Otis building, Chicago.

Southwestern Electrical and Gas Association. Annual convention, Galveston, Tex., May 18-21. Headquarters, Hotel Galvez. Secretary, H. S. Cooper, 403 Slaughter building, Dallas, Tex.

American Society of Mechanical Engineers. Spring meeting, Chicago, May 23-26. Headquarters, Congress Hotel. Assistant secretary, C. E. Davies, 29 West 39th street, New York City.

International Railway Fuel Association. Annual convention, Chicago, May 24-26. Headquarters, Hotel Sherman. Secretary, J. G. Crawford, 702 East 51st street, Chicago.

Electrical Supply Jobbers' Association. Thirteenth annual meeting, Hot Springs, Va., May 25-27. Headquarters, The Homestead. General secretary, Franklin Overbagh, 411 South Clinton street, Chicago.

Pacific Coast Geographic Division of the National Electric Light Association. Annual convention, Del Monte, Cal., May 25-27. Headquarters, Hotel Del Monte. Secretary, L. H. Newbert, 445 Sutter street, San Francisco.

National Electrical Light Association. Annual convention, Chicago, May 31-June 3. Headquarters, Drake Hotel. Executive manager, M. H. Aylesworth, 29 West 39th street, New York City.

North Central Electric Association. Annual convention, Duluth, Minn., June 14-16. Secretary, H. E. Young, 15 South Fifth street, Minneapolis, Minn.

Tri-State Water and Light Association. Annual convention, Asheville, N. C., June 15-16. Secretary, W. F. Steiglitz, Columbia, S. C.

National Fire Protection Association. Annual convention, San Francisco, June 14-16. Secretary, Franklin H. Wentworth, 87 Milk street, Boston.

Canadian Electrical Association. Annual convention, Quebec City, June 15-17. Secretary, Eugene Vinet, Power building, Montreal, Que.

American Institute of Electrical Engineers. Annual convention jointly with the Pacific Coast convention, Salt Lake City, Utah, June 20-25. Secretary, F. L. Hutchinson, 33 West 39th street, New York City.

Ohio Electric Light Association. Annual convention, Cedar Point, O., July 12-15. Headquarters, Breaker's Hotel. Secretary, D. L. Gaskill, Greenville, O.

National Association of Electrical Contractors and Dealers, Anniversary convention, Buffalo, N. Y., July 20. Secretary, W. H. Morton, 110 West 40th street, New York City.

Illuminating Engineering Society. Annual convention, Rochester, N. Y., Sept. 26-30. General secretary, Clarence L. Law, 29 West 39th street, New York City.

CONTRACTOR-DEALER

An Exchange of Ideas and Experiences on Advertising and Selling Methods, and Store-keeping for the Dealer in Electrical Goods

INSIDE ADVERTISING AIDS RETAIL ELECTRICAL GOODS SALES.

Customers Get Their Impressions Outside the Store, But Spend Their Money on the Inside Where Surroundings Should Be Pleasing.

By JAMES L. MAHON,
Advertising Manager, P. A. Geier Co., Cleveland, O.

Most merchants spend a great deal of time, thought and money devising advertisements which will catch the eye—newspaper advertisements for the hasty reader, street-car cards for the hustling strap-hanger, billboards for the speeding motorists, and letters bidding for a moment's glance from the harried business man. But these same merchants who try so hard to get their message to the outsider pay almost no attention to planning advertisements which will sell goods or suggest buying to customers who are actually inside their stores.

The man or woman on the street is an uncertainty. The man or woman in your store is a customer. Yet how does the merchant take advantage of this fact and utilize it? Generally he does not. He clutters his shop with fly-specked posters or wall cards placed with no thought for the general effect, and seldom, almost never changed. On a counter or on the wall is a rack containing advertising leaflets, much of it dog-eared and dealing with ancient models of electrical devices long since obsolete. No system is to be discovered in the placing of cards or posters. It's a hit-or-miss agglomeration which assails one's optic nerves. As far as the display material is concerned, many shops look as if there were no system present.

Perhaps one trouble lies in the fact that there is so much of this sort of material constantly flowing into the average retail store that the merchant is either confused or disgusted, or both. The morning mail arrives and the postman leaves with the letters a large, mysterious looking envelope labeled "What do you know about love?"

"Sufferin' short-circuits!" sighs the electrical dealer as he scans the pile. "More sales helps.

Scene in Package-Goods Department of Well-Appointed Retail Electrical Store in an Eastern City.

Nobody but a half-baked 'sales-helper' would mix love and business. They must think I'm as dumb as an army mule. What ails 'em?" And into the wastebasket—that's the way a lot of it goes. Or the exact opposite happens. The merchants thinks that all possible signs, cards, posters and racks must be on view all the time just because they happen to arrive. He thinks of them as so much furniture to be placed in the shop and kept there forever.

Creating an "Idea Bin" for Filing Sales Helps.

Of course, both extremes are bad. The very best course is the middle course. When a batch of advertising or sales promotion material comes your way dissect it as you would the turkey on Thanksgiving day. If you can't find immediate

Panel Screen for Electrical Show Window Showing Use of Posters Tying Up With National Advertising.

effective use for it, save it—designate some part of your stockroom as an "idea bin," and then, don't let that bin get dusty. It might be well to carry a card index on just the sort of sales helps you have in this idea bin.

Naturally, if you used it all as it came along your store would resemble a Chinese puzzle and you would bewilder your customers. The thing to do is to select that which can be used at once and save the rest for special drives. Make such a selection every month or 2 wks. to tie in with the advertising and sales program for that period. Let the store itself carry out the washing-machine idea, for instance, when washing machines are being advertised and shown in the window.

Choose a series of cards and posters which link together, and place them as effectively as possible. The National lamp poster frame, for instance, may be made the nucleus of a very striking arrangement. It is a substantial wooden frame with a removable back, and an easel support. Any poster placed in it will be effective if the display is not lost sight of among a multiplicity of other objects.

If you have a little spare wall space on which advertising posters can be displayed, do not clutter it with a great variety of hangers, but concentrate on one at a time. Cover it first with a fabric of subtle, unobtrusive tone, then place a frame and lamp poster in the center during your lamp campaign. When cleaners are the chief topic of conversation, use your cleaner posters. See to it that all the advertising and display material follows the keynote of the dominating picture—that the agency sign, counter racks and all leaflets, booklets, etc., descriptive of the main item on sale will be out in front where customers cannot fail to see and examine them.

Avoiding Confusion in Mind of Customer When Selling.

Do not misunderstand this to mean that the display should be concentrated solely upon a single item, and that all other advertising and sales suggestions should be removed; what is meant to be conveyed, is that it is more profitable to put forward one main thought than to confuse the customer with a heterogeneous mess of everything under the sun. For example, if your salespeople were instructed to say to the customer: "Can't I show you some knife switches, ranges, lighting fixtures, BX, tape, sockets, floor lamps, motors, fuses, Blake staples, separable plugs, panel boards, sign flashers, violet ray generators, toasters, bell-ringing transformers, hickeys, intercommunicating telephones, flashlights, conduit fittings, fireless cookers——," the customer would forget what he came in for.

The middle course, obviously, is the one to follow. "Key" the displays, advertising and sales effort to a dominating idea, and then utilize only such supporting advertising material as will give a buying suggestion to the customer without detracting from the main purpose.

This problem of providing suggestive advertising material which may be utilized permanently without interefering with the dealer's special selling drives is one upon which we have spent a great deal of time. The Royal agency sign and the National Mazda counter rack for advertising leaflets, illustrated herewith, are two excellent examples of this sort of inside advertising—effective, yet unobtrusive. Their value lies in the fact that they fit in with any special display which the dealer may use. They suggest buying, yet they do not shriek for attention.

To the average man an agency sign is simply an ordinary piece of advertising material. He doesn't give it much thought and doesn't consider it very valuable. But when you begin to study such a sign, especially if it is constructed of staunch, attractive material, you begin to see that it has big possibilities as a maker of sales.

First of all, the sign stamps your store as an authorized agency for whatever product it may represent. All women and most men like to feel that the dealer they do business with is in actual partnership with the manufacturer. It lends solidity. Both manufacturer and dealer gain by this. Then, too, the agency sign carries a trade mark which may be known to millions of women through the wide national advertising campaign of the manufacturer. A woman sees the advertising in her favorite household journal, she believes the product advertised to be serviceable, and the agency sign tells her that your store is the place to buy it. Thereby you get what the adman calls a "tie-in." In other words, you get a direct return on the manufacturer's national advertising.

This about sums up the purpose of all "inside advertising"—to tie in with the "outside advertising" and to suggest rather than to importune for business. Posters, hangers, counter racks, leaflets, booklets and agency signs, all should be

of a character that fits the high-class store and all should be used systematically and according to a constructive sales plan.

CENTRAL STATIONS AND MERCHANDISING POSSIBILITIES.

Paper Presented Before Illinois State Electric Association—Not Intended to Antagonize Established Contractor-Dealers.

By D. W. SNYDER, JR.

General Manager, Bloomington & Normal Railway & Light Co., Bloomington, Ill.

Retailing of electrical appliances covers a wide field and in volume amounts to approximately $2,000,000,000 annually. There is no intention in this article to set up the relative merits of the old controversy of whether a central station should, as such, do merchandising. The experience of a small central station that decided to do merchandising and the results attained will be given as an illustration of some of the possibilities of merchandising. This central station serves one community of 28,000 people and through transmission lines, about a dozen small towns.

The operating plan of the central station referred to provides for a local manager in each small town or group of towns. The maintenance of adequate service demanded a local man. These men, in order to do their varied duties, must be versatile and necessarily earn good wages. Their work incident to the operation of the electric utility only requires a portion of their time and the balance is available for other duties. In many of the small towns there is no other agency available to handle merchandise work as the total business in a community of approximately 1000 people can not support an independent electrical shop. The electrical energy sales can not provide sufficient revenue for a living wage for the local manager and leave a return to the company. The natural result was to utilize the spare time of the local managers in appliance sales.

Early in 1919 the rising costs incident to the war, coupled with the inability to raise rates, caused the management to turn to the one department of the business that was not regulated as to rates and did not require a great deal of new capital to develop. It was decided to establish a merchandise department in charge of a commercial manager who would rank with the other department heads. The new department handles all merchandising and new business, except certain types of industrial motor business, which is still under the jurisdiction of the electric distribution department.

The new department based its policy on the following principals: First, not to do house wiring in the large town where there were electrical contractor-dealers able to handle this class of work; second, to sell only those appliances which were meritorious and would stay sold; third, to co-operate with local electrical dealers and maintain fair prices; fourth, to so conduct the merchandise department that electric energy sales were increased, the use of electricity popularized and to better the service of the community.

The results in 1919 were highly satisfactory. New records for sales volume, net profits and new meter customers were made. The fiscal year 1920 showed still better records than in the previous year. The daily sales averaged about $500 per day and the net revenue earned was $36,244.50, from which should be deducted $9153.85, covering advertising and new business development expense, which is charged to the merchandise department to offset office rents and other items of general overhead. In addition to the above earnings the merchandise department made possible many savings in operating expense. The average merchandise stocks was $28,000, which includes small stocks in each town. This stock was turned five and a quarter times in 1920. In addition, approximately $25,000 was tied up in accounts receivable, some being on time payments on which interest is charged. This is partially offset by accounts payable. The accounts receivable on time payment plans could have been discounted through the Morris bank plan or similar arrangement. The company carried them themselves and it takes but a surprising short time to create a revolving fund sufficient to carry these accounts.

The following results attained last year in one of the small towns of 1300 population, indicate the value of a merchandise department to the central station:

Hoover sales	24	$1,563.25
Washing machines	11	1,544.00
Heating appliances	56	902.20
Fans	3	84.00
Motors	6	390.00
Lamps, wiring, etc.		3,499.41
Total		$7,982.86
Expense		5,437.60
Gross profit		$2,545.26
Advertising (local)	$208.00	
Portion commercial mgr. wages	155.00	
Misc. expense	120.00	
		483.00
Net profit		$2,062.26
Local mdse. stock (average)		$ 950.00

This statement is somewhat misleading as to capital invested in merchandise stock as the local stock was kept small compared to the volume of sales due to the fact that the central stock was called upon when needed.

The method of handling the merchandise department is comparatively simple. The commercial manager, by means of sales talks, educational letters and tabulated reports of business done in each town, keeps up enthusiasm and a spirit of friendly rivalry. All members of his staff are paid regular monthly salaries except vacuum cleaner salesmen who operate under the "Hoover Plan" and are paid commissions only. Nearly every month a campaign in some leader is put on, but rarely, if ever, is a cut price the feature of the campaign.

Certain contractor-dealers thought the program of advertising was aimed at them and voiced their complaint to the manager of the central station. His explanation was that the advertising was not directed against them but to draw the buying power of the public into the electrical trade. They were urged to increase their advertising, not in the spirit of competing against one another, but of the electrical trade competing against the field. The combined sales of the contractor-dealers also showed a healthy increase in 1920, which we believe proves the truth of the theory.

QUESTIONS and ANSWERS

All Readers Are Invited to Submit Contributions on Electrical Matters to This Department—Answers Should Be Sent Within Eight Days of Date of Publication of Question—Payment Will Be Made for All Answers Published

Questions.

No. 510.—Advisability of Holding Sales of Electrical Goods.—I have been endeavoring to learn from various sources, including jobbers, dealers, etc., the advantages to be gained by and the difficulties met with in conducting a sale or sales of electrical goods. Other merchants have sales for the purpose of raising money, reducing stock and cultivating new customers, and I want to find out if the electrical dealer can benefit by following their example. Will dealers or others in touch with the situation give their views on the subject?—W. R. B., Phoenix, Ariz.

No. 515.—Precautions Taken in Grounding Lines and Buses.—What precautions are taken to guard against errors in making ground connections in power houses to high-tension cables and buses? Mistakes that have been costly in both life and property have been made, and it is believed that a free discussion of present common practice will be of much benefit. What bus- and line-clip arrangements are used? What locks and hold cards are used? Is it common practice to check connections twice or to have two different men check the connections? Are definite steps taken to see that the ground is maintained even though a mistake has been made?—A. L. T., New York City.

No. 519.—Protecting Transformer Poles Near School Buildings.—In the safety-first meetings of the company where I am employed the matter of protecting transformer banks near school buildings has been brought up. The proposition is to determine what protection is required to prevent accidents that might result from children climbing the poles. What precautions are taken by other companies to guard against such accidents?—C. W. B., Enid, Okla.

No. 522.—Ringelmann Charts for Determining Smoke Density.—The use of Ringlemann charts is frequently mentioned in connection with the density of smoke from smokestacks. I would appreciate an explanation of what the Ringlemann chart is, and how the density of smoke may be determined by its use—B. L. V., Peoria, Ill.

No. 523.—Two Alternators Driven by One Source of Power.—Can two alternators of the same speed and voltage be installed on one shaft, driven by one source of power, and give good results when connected together electrically on the same transmission line? Can they be made to take load in proportion to their rated power by manipulation of the field current in each machine? One of the machines in question is of General Electric make, and is rated at 720 kw., 2300 volts, and 514 r.p.m. The other is a Westinghouse machine rated at 300 kw., with similar voltage and speed ratings.

These machines are now driven by separate twin water wheels with an excessive use of water.—L. J. L., Ausable Forks, N. Y.

Answers.

No. 518.—Use of Current Transformers.—Will someone please explain why current transformers are used in connection with a-c. ammeters instead of shunts? I presume that it is due to an ununiform reactance in the instruments with different current values. Am I correct, and are there any other reasons such as skin effect in the shunt or safety? Are shunts ever used, or were they ever used with a-c. ammeters?—J. B., New York City.

Answer.—Alternating-current ammeters are connected to the secondary terminals of current transformers for two reasons: First, alternating-current, unlike direct-current, will not divide between the two branches of a divided circuit in inverse proportion to the resistances of the two branches, if either of the branches contains inductance. Owing to this fact a shunted ammeter cannot be multiplied by a constant to obtain the maximum current in the main line.—W. F. P., Atlantic, Mass.

Answer.—The reason why current transformers are used with a-c. ammeters instead of using shunts is not that shunts are unsatisfactory or inaccurate, but because current transformers are more convenient, and, in the case of high voltage on the circuit which it is desired to meter, the current transformer serves as an insulator to keep the line voltage away from the instrument. In using a current transformer almost any length or arrangement of secondary or meter leads can be made, and other instruments may be connected in the same circuit, while if a shunt were used it would be necessary to have leads of a certain length. Shunt leads would have to be run in a certain way with relation to one another, and other instruments could not be connected in or removed without recalibrating the entire circuit.—H. A. D., Rochester, N. Y.

Answer.—There is no objection to using shunts in connection with a-c. ammeters where the pressure does not exceed 100 volts. Probably the main reason for the use of a series transformer lies in the fact that it separates the instrument from the high voltage of the line or bussbars, thus preventing injury to any one who might accidentally touch the instrument case. On extra-high voltages the problem of insulating the ammeter from ground, when using a shunt, would be difficult.

At one time it was common practice to use shunts with a-c. ammeters. The writer has operated a plant where the ammeters were connected to the circuits through shunts, the meters being of the hot-wire type with the shunts placed in the 11,000-volt circuits and the meters mounted on the switchboard panels. One can readily appreciate what the consequences would have been if an accidental contact had been made with the case of one of these instruments. It might be added that with transformers there is not the necessity for the use of carefully calibrated leads that are required with shunts.—R. H. P., Clemmons, N. C.

Answer.—A great advantage in the use of current transformers in a-c. circuits is due to the fact that their primary windings, which very often are connected to a high-voltage circuit, are insulated from the secondary windings and this makes the chance of the operator coming into contact with the high voltage greatly reduced. If a shunt was used the wires to instruments would carry the same voltage as the line. Shunts are seldom, if ever, used for a-c. measurements.

The ratio of primary to secondary current in current transformers is not constant for different values of primary current. This ratio depends

upon the resistance connected between the terminals of the secondary winding, and for this reason the ratio is determined for all values of primary current the winding is supposed to carry with a definite impedance or a particular ammeter connected in the secondary winding.

Current transformers are generally designed to supply a full load current of 5 amperes regardless of the ratios of transformation. Three or four instruments may be operated from one transformer with very accurate results.—W. J. M., New Bedford, Mass.

Answer.—It is not generally desirable to measure alternating current with an a-c. voltmeter and a shunt in the same way that direct current is measured. An a-c. voltmeter for measuring low voltages is not easily constructed because the resistance in series with the active winding must be small, or omitted entirely, and the errors due to inductance or temperature changes may be quite large. Therefore a relatively large voltage drop in the shunt would be required. Also, the division of current between shunt and voltmeter depends upon the inductance of the meter and in a measure upon "skin effect" in the shunt. For accurate a-c. measurements it is therefore desirable to use a current transformer which is designed to keep the secondary current nearly in phase with the primary current and proportional to it. Hot-wire ammeters have, however, been used successfully with shunts on 25 and 60 cycles.—L. M. K., St. Louis.

Answer.—Current transformers are used with a-c. ammeters to insulate the meter from the high voltage of the line being metered and because shunts will not work properly for such service. If the line was carried directly to the meter there would be danger to the operator in case he should touch a meter. Also, in some cases, when high voltages are being used the needle acts "sticky" because of static induction. A shunt is not to be relied upon because the meter is highly inductive while the shunt is noninductive. In fact, if a shunt were used and the current remained constant but the frequency varied the meter would act as a frequency meter.—C. O. R., Ontario, Cal.

No. 520.—Design of Windings for Induction Motors.—Will someone give formulas and examples for determining the proper size of wire and number of turns to be used in winding one, two and three-phase induction motors to operate on 25, 50 and 60-cycle lines at from 110 to 500 volts?—S. M. C., Quebec, Canada.

Answer.—This question is too general to be answered directly; for instance, a good single-phase winding will not do to operate on either 2-phase or 3-phase circuits unless it operates from one phase of the 2 or 3-phase system. Again, the best 2-phase winding does not do for 3-phase operation, nor does the best 3-phase winding do for 2-phase operation.

Assuming a 3-phase winding designed for 60-cycle operation, it will not operate properly on 50 cycles unless a reduced voltage of 50/60 of the 60-cycle operating voltage is supplied to it. This same winding, if put on a 25-cycle circuit must be operated on a voltage 25/60 times the 60-cycle voltage, in order to keep it from burning up due to excessive current. With reduced voltage, as pointed out above, the motor in question will not burn up, but a 60-cycle motor operating on 25 cycles does not operate as good as a regular 25-cycle motor because other features of design make a good 25-cycle motor differ from a good 60-cycle motor.

Assuming a specified horsepower rating, no one winding can be designed to operate on 110 to 500 volts, unless the leads are so brought out that on 110 volts you have all groups parallel and can change them to, say, two groups in parallel for 220-volt operation and all groups series for 440-volt operation. This works out well with a 4, 8 or 12-pole winding, but if you have a 6-pole winding you would have six poles in parallel for 110 volts, three poles in parallel for 220 volts, and should have one and a half poles in parallel for 440 volts, which is physically impossible.

Now, as to the number of turns required, here again there are factors which must be known before a definite answer can be given. For instance, one must know the width of iron and the number of slots in the punchings. There is a good winding that has 28 conductors per slot in a 48-slot punching which is not any good at all with 28 turns per slot in a punching having only 36 slots. Both of these punchings will make excellent motors if the proper number of turns are put in each. This argument will hold good for either single-phase, 2-phase or 3-phase and for 25, 50 or 60-cycle machines.

As to proper size of wire, this is determined by the heating. If a conductor is to carry, say, 50 amperes it will heat a certain amount. If that heating is too much a larger size of wire is necessary. In commercial practice the smallest possible size of wire is used because it is easier to handle and is also very desirable from an economic standpoint. Manufacturers even go farther than that, using smaller wire with forced ventilation to keep the machines cool. Assuming a 50-hp., 4-pole, 3-phase, 220-volt, 25-cycle motor which has an efficiency of 90% and a power-factor of 91%, full-load current will be given by the formula:

$$I = (746 \times HP)/\sqrt{3}(E \times Eff. \times PF)$$
$$= (746 \times 50)/\sqrt{3}(220 \times 90 \times 91)$$
$$= 120 \text{ amperes.}$$

In this case all the poles are in parallel so each conductor must carry one-fourth of 120, or 30 amperes. It requires a No. 7 conductor to handle this current, to keep in safe heat limits. You would probably not use a No. 7 wire, but use its equivalent—2 No. 10 or 4 No. 13 wires in parallel.—H. J. J., St. Louis.

No. 521.—Drilling Glass, Marble and Porcelain.—Will some one please supply information as to the proper methods to be used in drilling glass, marble for switchboards, and porcelain?—O. M. B., Jackson, Mich.

Answer.—Glass can be drilled, using a copper rod, emery and turpentine, or with the broken-off end of a rat-tail file, using turpentine and camphor. The writer has seen holes drilled in plate glass with the ordinary cutting burrs used by dentists in cutting teeth in preparation for filling. Marble can be drilled by an ordinary twist drill. Porcelain is best drilled with a pencil-shaped carborundum stone, using turpentine for a lubricant. The only material that will cut porcelain successfully is carborundum.—H. C., Bridgeport, Conn.

APPLIANCES and DEVELOPMENTS

New, Improved or Interesting Electrical and Mechanical Apparatus and Devices, and Applications of Equipment and Methods in Practice

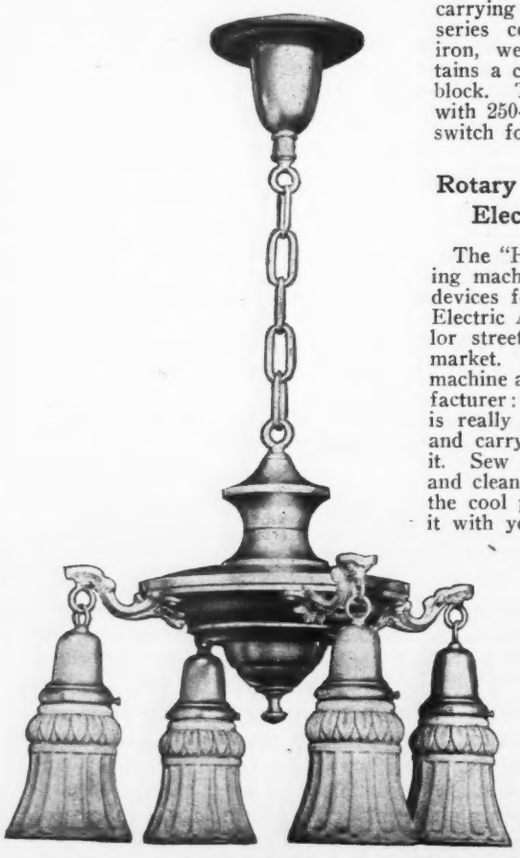
Features of Beaver Feed Through Switch.

One of the features of the new feed through switch recently placed on the market by the Beaver Machine & Tool Co., Inc., of Newark, N. J., is its shape. It is designed to harmonize more closely with the wire connected through it, both in size and contour. Its lines are long and narrow, presenting a graceful and artistic effect when connected up. The chief advantage claimed for the Beaver feed through switch is that its mechanism can be removed from the casing, connected and replaced after connections are made, easier and quicker than many other switches of a similar character. Other special Beaver wiring devices include pendant switches in both brass and porcelain and a new "Noscru" canopy switch, which has been improved.

Colonial Lighting Fixtures in French Gray Finish.

A complete house set of lighting fixtures, consisting of dining room, parlor, living room and bedroom ceiling fixtures with side brackets to match is now being manufactured by the Colonial Chandelier Works, 122 Centre street, New York City, and marketed under the name of "6000 Line Colonial Style" lighting fixtures.

These fixtures are constructed of 22-gauge solid brass, with the exception of the chain, are 36 ins. long and finished either in a handsome French gray or Jap gold. The entire product is made and assembled in one establishment, and the particular attention given to work sometimes regarded as minor details, is one secret of the success of this company. The complete French gray finish attracted favorable comment at the recent Buffalo Fixture Market and therefore the line holds unusual interest for jobbers.



"6000 Line Colonial Style" Lighting Fixtures.

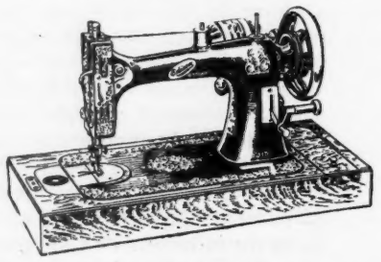
Type ZY Condulets for Motor-Driven Machines.

Crouse-Hinds Co., Syracuse, N. Y., has issued a folder bearing the title "For Your Electrical Installations," which illustrates and describes ZY condulets applied to motor-driven machines. The claim is made that the type ZY condulets are "safety first" devices in all respects, as they protect the switch operator and person renewing fuses; they withstand the roughest usage; they cannot be operated by accident and are so designed that water will not drain into them, neither can lint nor other inflammable particles lodge upon the current-carrying parts. Each condulet of the series consists of a substantial cast-iron, weatherproof housing that contains a combined snap switch and fuse block. These condulets are furnished with 250- or 600-volt, 3- or 4-pole snap switch for motors of 2 hp. or less.

Rotary and Vibratory Type Electric Sewing Machines.

The "Hotpoint" portable electric sewing machine is one of the labor-saving devices for the home which the Edison Electric Appliance Co., 5600 West Taylor street, Chicago, has placed on the market. Some of the features of this machine are thus described by the manufacturer: It is a sewing machine which is really portable—you just pick it up and carry it wherever you want to use it. Sew where the air is the freshest and cleanest, and the light the best—on the cool porch, the sun parlor, or take it with you in the car to your friend's house. That is just what the "Hotpoint" portable electric sewing machine will let you do. With a "Hotpoint" you can sew the quick and easy way—the better kind of sewing that will be a real pleasure to you. There is no tiresome and wearying pedaling—just a light pressure on the foot control and the machine is running, fast or slow, just as you require. The pressure of your foot controls it easily. Simple adjustments and a complete set of attachments make it easy to do any sort of plain or fancy sewing. It sews much faster than you could treadle on the ordinary sewing machine.

There are various types of the "Hotpoint" portable sewing machine, such as

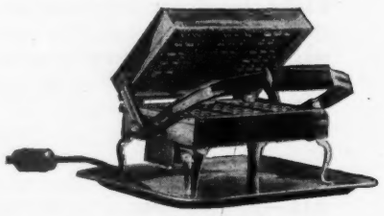


"Hotpoint" Portable Electric Sewing Machine.

the rotary shuttle type, the three-quarter head vibrating shuttle type and the full-head vibrating shuttle type. The vibrating shuttle sewing machine is the type that is most widely known. It has many desirable and exclusive features, such as an adjustable tension, automatic bobbin winder, thread distributor, etc.

Electric Waffle Iron Equipped With Through Switch.

A new electric waffle iron has been placed upon the market by the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa. Simplicity and ease of operation as well as sturdiness



Electric Waffle Iron.

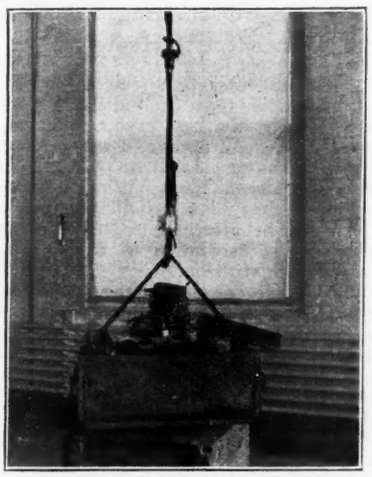
are the features of this waffle iron. The opening of the iron is accomplished by simply pulling down the handle and the closing is done by raising the handle. The waffle iron has a highly polished finish and is equipped with a through switch and tray.

Tenacity Test of Electric Outlet Plug.

"How heavy a chandelier will it hold?" This question has been asked frequently about the new type of electric outlet plug that recently has made possible the utmost flexibility in lighting. The answer was supplied by a recent tenacity test, the result of which showed that one of the new chandelier plugs, with its curved blades, will safely support a weight far in excess of its rated

capacity of 100 lbs. Few chandeliers weigh over 50 lbs.

One of the new plugs was placed in a ceiling receptacle. These plugs are made in two pieces, one of which is inserted in the contact slots at a time, the curved blades of each section pointing in opposite directions. With this insertion the electrical and mechanical connections are made at the same time. On the hooks of the plug was hung a brass-plated steel fixture chain, the links of which were 2.0625 ins. long and of 0.093-in. stock. On the other end of this chain was attached a heavy wooden box. Then, chunk by chunk, iron billets were thrown into the box. At a load of 192 lbs. the chain parted and the box of iron fell to the floor. The test was continued with another steel chain, with links 1.75 ins. long and of



"Elexit" Receptacle and Ceiling Plug Supporting 310 Lbs. Weight.

0.110-in. round stock. This chain parted at 212 lbs.

Chains failing, a steel cable was substituted and the test resumed. More chunks of metal were thrown into the box. At 310 lbs. the plug clung to its receptable with a bulldog grip, firmly supporting the tremendous weight. Thirteen more pounds of metal were loaded into the container. With this the bronze contact brushes of the receptacle bent so that the blades of the plug escaped from the supporting surfaces and twisted themselves out of the receptacle.

This test removed all apprehension as to whether the new installation method is successful as far as the question of support goes. The wall plug of the new plan is made on the same curved-blade principle, but the blades both point upward as they are inserted in the contact slots. These, too, have demonstrated that they are capable of sustaining all kinds of wall brackets without vibrating or working loose.

Homes, offices, hotels, hospitals and public buildings of all kinds will be benefited by the advantage of the new flexible installation system. A number of the new electric outlets may be installed on the walls and ceilings of each room during the construction of a building. These are ready for the instant installation of any kind of electric fixture or appliance in any part of the room. Fixtures may be put up, or taken down, or replaced by a fan, or other appliance, in a few seconds' time, and, of course, without the aid of an electrician. The Electric Outlet Co., of New York City, is exploiting this plan of fixture installation.

Low-Head Water Wheel Units of Medium Size.

To meet the need of the small and medium size low-head water power applications, a line of low-speed vertical-shaft generators has been placed upon the market by the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa. This line consists of machines of 112 different kv-a. and speed ratings, ranging from a frame size having a rating of 62.5 kv-a. at 300 r. p. m. to a frame size having ratings up to 1300 kv-a. at 180 r. p. m., 100 kv-a. at 138 r. p. m., 825 kv-a. at 120 r. p. m., and 550 kv-a. at 100 r. p. m.

This line of generators has been designed in its mechanical features to meet the special requirements of the combined hydraulic unit. The generator base is of such diameter as to permit a wheel pit of sufficient diameter to provide for the ready removal of the turbine runner and head cover. Each generator frame is provided with a Kingsbury thrust bearing and upper and lower guide bearings. All bearings are lubricated by a self-contained circulating oiling system. An exciter, driven pulley and idler pulley for use with a horizontal belted exciter are included with the generators. The standard generator parts are so designed that a mechanically operated friction brake can be supplied when desired. Provision is made, where unusual hydraulic or load conditions make additional flywheel effect necessary, for mounting a separate fly below the shaft coupling.

New Type of Fixture and Outlet Box Hanger.

The Paine fixture and outlet box hanger is adapted for work in lath and plastered walls and ceilings. It is a device containing two wings mounted on a 0.375-in. nipple 2.5 ins. long, with a key through the center of the nipple arranged so as to lock the wings when they are in open position. There is a lock-nut provided on this nipple to hold the outlet box against the ceiling or wall. The wings, when in a folded position, are 5.5 ins. in length and can be inserted through a hole 1.125 ins. in diameter. When in attaching position the wings give a spread of 11 ins. The Paine hanger can be attached to the outlet box before inserting it in the ceiling or wall, thus eliminating considerable overhead work in attaching the boxes the old way. There is sufficient

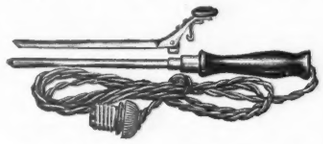
Paine Fixture and Outlet Box Hanger.

room between any two knockouts to allow for BX fittings.

This device is manufactured by the Paine Co., 1742 West Van Buren street, Chicago, and the maker states that the quickness with which this hanger can be applied will more than pay for it in the saving of time and labor. To remove the hanger it is necessary to insert a screwdriver upwards through the hickey or nipple. This will raise the key which will allow the wings to fold and the hanger to be removed. There are no small wires to contend with and no loss of time in attaching, according to the manufacturer.

Larger Type of "Hold-Heet" Curling Iron.

The Russell Electric Co., 140 West Austin avenue, Chicago, has recently placed on the market its No. 36 "Hold-Heet" curling iron, which is a larger device than its No. 31. The complete iron is 11.5 ins. long, while the rod is 6.5 ins. long and 3/8 in. in diameter. The manufacturer is using an attractive new design of handle finished in dull black ebonoid. A new method of securing the clamp has been devised, so that while it is easily removed when desired, there is no chance of its becoming loose or falling off accidentally. Special care has been devoted to securing a firm spring action at the end of the clamp, even when the clamp is only opened a trifle. This iron is supplied complete with separable attachment plug and is furnished with a nickelplated finish.



Russell Electric Curling Iron.

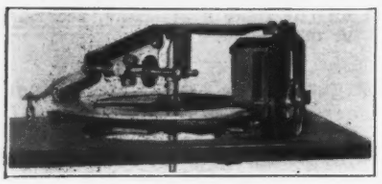
New Type of Phonograph Motor Recently Developed.

Ever since it was realized that the phonograph was to become one of the most desirable of musical instruments, attempts have been made to replace the spring motor with an electric motor for driving purposes. Several conditions arose which have made this change highly impractical, the principal difficulties being elimination of noise and lowering of production cost. The elimination of noise has been the stumbling block for most attempts at electric drive, this being due to the fact that the motor is mounted directly above the bell or sounding apparatus of the phonograph, and any tendency to vibrate is immediately amplified so as to interfere with the reproduction of the record. This fact limits the class of motor that can be used to one having a comparatively low speed. There are other points which enter into the question of design, such as the necessity for a high starting torque to get the record up to speed quickly, and the need for constancy of speed through wide variations of load due to differences in sound.

The Fort Wayne works of the General Electric Co. has developed a motor to be used on phonographs which meets all these requirements and which presents several interesting and novel features in design and operation. The motor is a small induction motor, somewhat similar to those used as the motive power of induction watt-hour meters, and consists of a rotating element fastened to the shaft of the turntable and running

between two field coils. The rotor is formed of a ring of copper of about 6 ins. inside diameter, and about 1.5 ins. wide supported from the main shaft by a cast of aluminum spider.

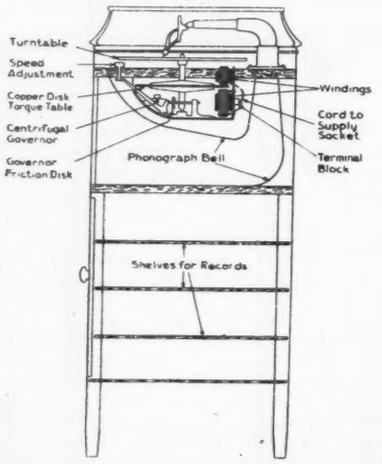
The rotor revolves through a shifting magnetic field produced by field coils wound on laminated magnetic circuits.



Side View of Pathe Phonograph Motor Showing Terminal Arrangement.

Thus, since the revolving element is fastened directly to the main shaft, all necessity for high-speed gearing, belting, or friction drive is entirely eliminated. This main shaft is supported below on an adjustable hardened-steel ball thrust bearing in the lower bracket, and is held in place by a guide bearing of phospher bronze in the upper bracket. The lower bracket also supports a governor which is geared to the main shaft by a worm gear.

It was quite difficult to eliminate the noise caused by the magnetic hum, due to the 60-cycle circuit, but this was accomplished by a proper design of the supporting brackets and spider, as well as by the elimination of vibration in the motorboard itself. By suspending the motor from the board by three screws to the upper bracket, the screws being surrounded by sponge rubber bushings



Cross Section of a Phonograph Motor Installation.

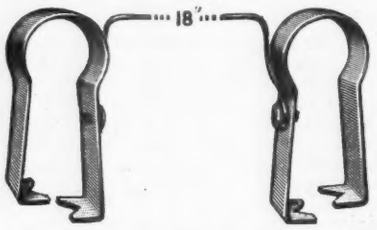
and washers, transmission of vibration to the board was made impossible. It was also found that an aluminum spider for the rotor was very much quieter than one of cast iron.

The torque characteristics of the motor make it admirably suited to service in a phonograph where quick acceleration and good speed regulation are desirable. The motor exerts maximum torque at standstill, the torque gradually decreasing with increasing speed to the free-speed-no-torque condition. Any tendency to slow up while running is counterbalanced by an increase in torque, resulting in very close speed regulation under widely varying loads. The simple construction, few moving parts—two only—the absence of sliding contacts and the small amount of power consumed in bearing friction, all combine to give the motor a life that is probably limited only by the life of the insulation itself.

Tool for Connecting Batteries for Charging.

A simple, practical, convenient and inexpensive tool for use in connecting storage batteries for charging has recently been placed on the market by the Mueller Electric Co., at 2135 Fairmount road, Cleveland. This device is known as the "Attacho Battery Jumper," and consists of two lead-coated clamps connected by 18 ins. of lead-coated copper wire.

It is intended primarily for use on batteries fitted with the standard tapered terminals. On these terminals the hair-lip jaws take a strong hold and the clamp stands firmly upright, with no tendency to lop over, it is said. The clamp is a one-hand affair. The proper

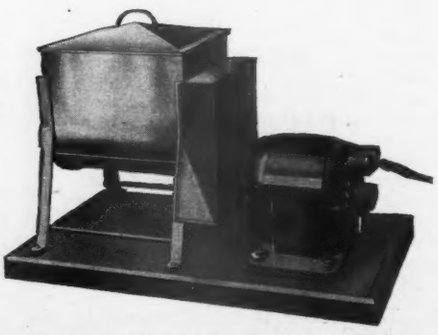


The "Attacho Battery Jumper."

method to pursue is to grasp the shorter leg between the thumb and two fingers, hook the longer leg over the top of the terminal and spread the clamp by pulling toward you.

Electric Whipping Device for Soft Drink Parlors.

There has grown up as an important supply line for "soft drink parlors" and "fountain lunch" shops the manufacture of dressings or "toppings," as they are termed, for all sorts of dainty desserts, and so thoroughly organized is this business that its regulation extends even to a restriction of the quantities to be supplied at a time, to the end that its product shall always be available in the freshest and best condition. These toppings are made in various flavors and are sold under the trade name of "Mallo." As an important adjunct to the delivery of these toppings to the customer in their best state the makers advise with the use of their product the electric whipping outfit shown in the illustration. In this the Bodine motor, made by the Bodine Electric Co., 2256 West Ohio street, Chicago, is mounted on the same base as the whipping device with which it is connected by pinion and reducing gear.



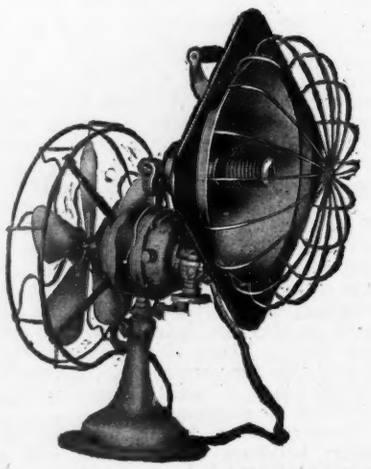
Topping Whipper Connected to Bodine Motor.

It is stated that by the use of the electric whipper fully double the volume of dressing can be obtained from each can of "Mallo," the result being a delicious topping which will retain its velvety smoothness and sweetness longer than whipped cream. The electric whipper is made by the White-Stokes Co., Inc., 150 West Lake street, Chicago, and 253 Thirty-sixth street, Brooklyn, N. Y.

Converting Oscillating Fan Into an Electric Heater.

The usual objection raised to the portable rigid type of radiant electric heater is that the heat rays are concentrated on a small area, and to overcome this disadvantage L. Plaut & Co., 434 East 23d street, New York City, has developed the "Plaut" oscillating heater which can be attached to the ordinary electric fan, as shown in the accompanying illustration.

This device consists of the copper reflector, heating element and guard, or the working part of the "Hotpoint Hedlite" heater, fitted with a simple clamp and a wing or thumb screw which enables the complete heating unit to be securely attached to any type of electric fan. With an oscillating type the heat rays are sent to every section of the room instead of to one portion, and the automatic 20 to 30 oscillations per minute interrupt often enough to prevent excessive heat at any one point. In addition the fan becomes of use to the owner all the year round and in the winter time the fan guard and blades



Plaut Heater Attached and Ready for Operation.

may be removed, although running at low speed the breeze acts as a pleasant distributer of the heated air. This heater is claimed to do more than the old style heaters by automatically sending just the right amount of heat everywhere and giving multiplied efficiency without added cost. In other words, a cooling joy in summer and a burning need in winter.

ACTIVITIES IN THE TRADE

Business Developments, Sales Agencies, Trade Literature and Miscellaneous Items Concerning Electrical Manufacturers and Allied Business Interests

Maytag Washing Machine Co., Newton, Ia., has purchased the Turner Brass Works, Sycamore, Ill.

T. W. Colyer Co., Inc., Philadelphia, has filed notice of change of name to the Lyon Electric Shop, Inc.

Robert E. Denike, Inc., New York City, electrical contractor, has leased property at 155 East 33d street for a new local establishment.

E. O. Dorsch Electric Co., St. Louis, contracting electrical engineer, has announced that it is now located in new quarters at 1405 Olive street.

Aqua Electric Heater Co., Bridgeport, Conn., has filed notice of increase in capital from $200,000 to $1,000,000 for proposed expansion.

Alpha Electric Co., 151 West 30th street, New York City, has filed notice of increase in its capital stock from $50,000 to $200,000 for expansion.

Alt-Le Lighting Fixture Co., 262 Bowery, New York City, has filed notice of increase in its capital stock from $15,000 to $75,000 for expansion.

Northwestern Electric Equipment Co., New York City, has leased the 5-story building at Washington and Beach streets, 60 by 60 ft., for a new plant.

Donald B. Howard Heater Co., Des Moines, Ia., manufacturer of heating equipment, radiators, etc., has changed its name to the Success Heater & Manufacturing Co.

L. Plaut & Co., 434 East 23d street, New York City, has commenced the manufacture of the "Plaut" oscillating heater, an electric heater which can be attached to the ordinary fan motor.

Bowen Motor Railways Corp., St. Louis, manufacturer of electric-railway equipment, is considering a site at Richmond, Cal., for the erection of a plant. A. D. Bowen is president of the company.

Ohio Bell Telephone Co. has announced that the offices of the engineering department now at 212 West Washington street, Chicago, will be located at 4300 Euclid avenue, Cleveland, after April 1.

Bullock Manufacturing Co., 408 West 13th street, New York City, manufacturer of electric lighting fixtures and equipment, has purchased the 6-story building at 356-58 West 40th street, held at about $75,000. The new owner will make alterations and improvements, and will use the structure as its main works.

Home Appliance Manufacturing Co., Winnipeg, Can., recently commenced manufacturing operations under a Dominion charter. The company is capitalized at $200,000 and is comprised of local business men. Washing machines similar to those previously imported from the United States will be manufactured by the company.

Peerless Storage Battery Co., Louisville, Ky., has filed notice of change of name to the Wolke Lead Batteries Co., at the same time increasing its capital stock from $500,000 to $1,250,000 for proposed expansion.

Wagner Electric Manufacturing Co., St. Louis, has moved its Boston office and service station to larger quarters in the building at 342 Newbury street, where Brooks Faxon is in charge as district manager.

Joplin Armature Works, West 4th street, Joplin, Mo., has purchased the plant and business of the Electrical Appliance Co., and plans to make a number of extensions, including the installation of new equipment. F. E. Belden is president.

Packard Electric Co., New York City, manufacturer of transformers, starting, ignition and lighting cable, has moved into new quarters in the Printing Crafts building, 461 Eighth avenue. J. E. Erickson, manager for the New York district, is in charge.

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., has issued Reprint No. 94 describing the Westinghouse system of sectional individual motor drive for paper machines. This is a reprint of an article by Stephen A. Staege, general engineer.

Dexter-Reynolds Manufacturing Co., 130 North Wells street, Chicago, which was recently incorporated to manufacture washing machines, has elected the following officers: President, C. H. Reynolds; secretary, L. M. Kerrigan, and treasurer, A. L. Dexter.

Manning, Maxwell & Moore, 119 West 40th street, New York City, has announced the recent acquirement of the good will and merchandise of Patterson, Gottfried & Hunter, 211 Centre street, New York City—the 32-yr.-old tool and supply house. The old establishment will be vacated and the goods put into the stocks of the new owners.

Manning, Maxwell & Moore, mill and factory supply manufacturers, 119 West 40th street, New York City, held an impromptu informal dinner and the annual get-together affair of the New York sales and office force at the Hotel Astor recently. E. M. Moore, vice-president, acted as toastmaster, and addresses were made by F. W. Knowles, comptroller; T. S. Stevens, sales manager of machine-tool department, and P. M. Brotherhood, chief executive officer. Afterwards the entire party attended the performance of the "Passing Show of 1921" at the Winter Garden theater. Plans are now being formulated for a company outing this summer in the vicinity of New York in which all members of the organization in this and adjoining territory will be invited to participate.

SKF Industries, Inc., 165 Broadway, New York City, has issued a booklet on "SKF" marked power-table brackets for sewing machines equipped with self-aligning ball bearings, in which the advantages of the installation are presented in detail, together with a cross-sectional view of the bearing.

Conveyors Corp. of America, 326 West Madison street, Chicago, has announced that the steady increase in business has necessitated the doubling of the number employed in its South Bend (Ind.) plant. The corporation manufactures the "American" line of trolley carriers and steam ash conveyors.

Valley Electric Co., 3157 South Kingshighway, St. Louis, has issued a bulletin illustrating and describing the "A-C Floating Battery System," which it is claimed combines the advantages of a-c. transmission and a fully charged storage battery for signal service.

Stanley Insulating Co., Great Barrington, Mass., has been acquired by new interests, reported to include officials of Landers, Frary & Clark, New Britain, Conn., manufacturer of electrical heating and cooking equipment. Operations will be conducted as heretofore and there will be no change in the personnel of the company at the present time.

Electric Furnace Construction Co., 908 Chestnut street, Philadelphia, has announced that a "Greaves-Etchells" electric furnace has recently been started up at the Electric Steel Products Co., Turners Falls, Mass. The furnace will be used for the manufacture of special castings. The equipment was installed and supplied by the Electric Furnace Construction Co.

General Electric Co. has awarded all miscellaneous contracts for the erection and completion of the 1-story addition to its building No. 67, 678 Western avenue, West Lynn, Mass., 90 by 180 ft., to cost about $50,000. The work will be rushed to allow the earliest occupancy. The company is also building a 1-story addition to its River Works, building No. 63, 177 by 220 ft.

Cutler-Hammer Manufacturing Co., Milwaukee, has distributed to jobbers and retailers of C-H 70-50 switches a folder known as publication 2015 and entitled "Telling the Public About the Switch You Sell." The various advertisements to be run this year in different magazines are reproduced, and a graphic chart shows the dealer how many people will be reached through this advertising during each month of the year. The new 70-50 switch display cabinet is illustrated in colors, and several lantern slides and small advertisements explaining the convenience and advantages to be obtained from the C-H 70-50 switch are shown.

PERSONAL MENTION

Biographical Sketches and Chronicle of Changes in Business Connections, Promotions and Other Personal News of the Industry

M. D. SUMMER has been appointed manager of the Buffalo (N. Y.) district office of the Packard Electric Co., Warren, O.

GILBERT E. RYDER has been elected vice-president of the Superheater Co., New York City, formerly the Locomotive Superheater Co.

SHIRAS MORRIS, president of the Hart & Hegeman Manufacturing Co., Hartford, Conn., has been elected a director of the Terry Steam Turbine Co. to succeed Joseph H. King, who has resigned.

LOUIS T. KLAUDER, Philadelphia, has resigned as construction engineer for the Philadelphia Rapid Transit Co., and has opened offices in the Pennsylvania building as a consulting engineer to specialize in power-plant design and construction.

E. J. WOOD, formerly connected with the works management department of the Westinghouse Electric & Manufacturing Co., is now manager of the factory-control department of the Columbian Enameling & Stamping Co., Terre Haute, Ind.

R. S. MOORE has resigned as vice-president in charge of the New England investment business of H. M. Byllesby & Co. The company's offices at Boston are being enlarged by the addition of 2000 ft. of first floor space at 14 State street.

H. A. DEFRIES, formerly vice-president of Hamilton & Hansell, Inc., has opened offices at 15 Park Row, New York City, as a consulting engineer and metallurgist, specializing in electric furnaces and electric furnace plant construction, etc.

EDWIN L. WILLSON, president of the Connecticut Electric Steel Co., spoke on "The Electric Furnace in the Manufacture of Steel Castings" at the March meeting of the Hartford (Conn.) branch of the American Society of Mechanical Engineers.

T. O. GRISELL has been appointed sales manager of the Green Engineering Co., East Chicago, Ind., manufacturer of steam jet ash conveyors, chain grate stokers, etc., to succeed Walter S. Burke, who has been made New York representative of the company.

WALTER C. STRUNK, who was formerly connected with the motive-power department of the Interborough Rapid Transit Co., New York City, has accepted a position in the stoker division of the Westinghouse Electric & Manufacturing Co. at Lester, Pa.

M. F. GREEN has recently been appointed southern sales manager of the Arrow Electric Co. of Hartford, Conn., manufacturer of electrical wiring devices. His headquarters will be at 804 Continental building, Baltimore and Calvert streets, Baltimore. Mr. Green will have charge of sales in all southern Atlantic states.

HARRY E. MARSHALL has been appointed Pacific Coast representative of the Mueller Electric Co. of Cleveland, manufacturer of "Universal" battery and test clips, with offices and warehouse at 332 Leavenworth street, San Francisco.

EDWARD RAHM, JR., has established an office in the Oliver building, Pittsburgh, under the name of the Industrial Equipment Co. to handle power-plant equipment, with special reference to combustion. He was formerly Pittsburgh manager for the Underfeed Stoker Co.

JULIUS L. HECHT, who was recently elected assistant to Vice-President Frank J. Baker of the Public Service of Northern Illinois, 72 West Adams street, Chicago, has been in the employ of the company since 1905. Mr. Hecht became mechanical engineer in charge of the operation of stations in 1907 and later was appointed superintendent of electrical production. He has been in charge of the Industrial Relations Department since its creation. In addition to other duties Mr. Hecht has taken over the work of the late George H. Lukes, who was general superintendent. Mr. Hecht is a graduate of the Massachusetts Institute of Technology, 1904, a vice-president of the Western Society of Engineers, president of the National District Heating Association, and a member of many technical societies.

J. L. Hecht.

G. S. CRANE, who has been manager of the Cleveland office of the Cutler-Hammer Manufacturing Co., has been appointed manager of controller sales at the main office in Milwaukee. L. B. Timmerman has been placed in charge of the Cleveland office and will act in the capacity of assistant to A. G. Peirce, manager of the Central District. The Cincinnati office will become a part of the Central District with R. I. Maujer as branch manager. E. N. Lightfoot has assumed the title of manager of the heating department, with headquarters at the New York works, and will be in charge of all matters relating to the sale of electric-heating devices.

H. C. HOAGLAND, formerly vice-president and general manager of the Central Oklahoma Light & Power Co., has resigned to become general manager of the Oklahoma Natural Gas Co. He has been a member of the H. M. Byllesby & Co. organization for about 10 yrs., serving at different times as manager of the Muskogee (Okla.) Gas & Electric Co. and the Fort Smith (Ark.) Light & Traction Co., in addition to the position from which he has recently resigned.

JOHN J. MORAN, of the Chicago, North Shore & Milwaukee Electric Railroad Co., is traveling over the state of Illinois in the interests of the Illinois Committee on Public Utility Information. He is speaking before chambers of commerce, industrial organizations, men's and women's clubs and students in universities, colleges, etc. The idea of Mr. Moran and the Illinois Committee is to inform the people of the real facts as to electric-railway investments in the country, how close they are to the people, the number of passengers and the amount of freight which they carry, and the part which the electric roads take in the economic development of the country.

OBITUARY.

THOMAS HENNING, formerly chief operator of the Western Union Telegraph Co., Buffalo, N. Y., died recently at the age of 77 yrs. He was well known in telegraph circles 40 yrs. ago, being one of the leading electricians of his day.

J. A. BEVERLY, of the J. A. Beverly Co., 5 How street, Haverhill, Mass., one of the pioneer electrical contractors in that city, was killed recently by the accidental discharge of a shotgun while away on a hunting trip. He was an active member of the Massachusetts State Association of Electrical Contractors and Dealers.

HARRY F. TATE, for years Western manager of the National Conduit & Cable Co., died at the West Side Hospital, Chicago, March 14. He was born in Dewart, Pa., in 1863. For the past 2 yrs. he had been associated with the Baltimore Tube Co. He was a member of the Chicago Athletic Association and also of the Masonic fraternity.

JOSEPH C. LOVE, assistant treasurer of the Pacific Gas & Electric Co., San Francisco, died recently at the age of 64 yrs. He first became connected with the electrical industry in 1901 as accountant for the California Central Gas & Electric Co., and from that time until his death he was identified with the accounting branch of the Pacific Gas & Electric Co. and its predecessors.

BUSINESS OPPORTUNITIES

News of Electrical Construction Projects in All Parts of the Country, Proposals Invited, Foreign Trade Openings and New Companies

EASTERN STATES.

Boston, Mass.—The City Council has passed a resolution directing the corporation counsel to petition the Department of Public Utilities for a reduction in the price of electricity, including power service, in the municipality.

Springfield, Mass.—Electrical equipment will be installed in the 4-story addition to be constructed at the plant of the Joseph Whitcomb Co., Railroad street.

Woods Hole, Mass.—The Bureau of Fisheries, Department of Commerce, Washington, D. C., has broken ground for its proposed local power house, 2-story, 48 by 60 ft. The cost is estimated at $51,000.

New Haven, Conn.—The United Illuminating Co. has filed plans for the erection of a 1-story addition to its power house on Grand avenue, 69 by 88 ft., to cost about $29,000.

Waterbury, Conn.—Electrical and mechanical equipment will be installed in the 1-story brass mill, 155 by 160 ft., to be erected at the plant of Scoville Manufacturing Co., Bridge street, estimated to cost $100,000.

Brooklyn, N. Y.—The Brooklyn Edison Co. has filed plans for the construction of a 2-story substation, 30 by 100 ft., on Sumpter street, near Stone street, to cost about $60,000. The company will also construct a coal hoisting and handling plant on 66th street, to cost about $125,000.

Brooklyn, N. Y.—Plans are being revised for the proposed ice-manufacturing plant to be erected on Tilden street, near Flatbush avenue, by Rubel Brothers, to cost about $500,000. Considerable electrical equipment will be installed.

Cadyville, N. Y.—The International Paper Co., 30 Broad street, will soon take bids for the erection of its proposed hydroelectric power plant on Saranac road, Cadyville, to cost about $250,000. A. H. White, 30 Church street, is architect and engineer.

Jamestown, N. Y.—The Board of Water and Lighting Commissioners has taken bids for the erection of an addition to the municipal electric power plant on Steele street.

Malone, N. Y.—The Malone Light & Power Co. has filed notice of increase in its capital stock from $300,000 to $600,000 for proposed extensions and improvements.

New York, N. Y.—The United Electric Light & Power Co., 130 East 15th street, has taken out building permits for the erection of the superstructure of its steam-operated generating plant on 134th street, near Locust avenue, estimated to cost $2,750,000. Frank W. Smith is vice-president in charge.

New York, N. Y.—The Board of Estimate, Municipal building, is considering a proposition submitted by Grover A. Whalen, commissioner of plants and structures, for the construction of a municipal power plant at the St. George ferry terminal, Staten Island, to be used for service for the ferry property, shops, new city docks at Stapleton, municipal traction lines and other municipal work. The Richmond Light & Power Co., with plant at Livingston, S. I., is now furnishing service here.

New York, N. Y.—The New York Edison Co. will furnish the increased light and power requirements in the addition to the Bush Terminal Sales building, 130 West 42d street, now in course of erection. The total installation will comprise 7720 lamps, with 525 hp. for motors, house pumps and ventilating system.

Tonawanda, N. Y.—Electrical equipment will be installed in the plant to be erected here by the J. Spaulding Sons' Co., 484 Broome street, manufacturer of fiber products. George F. Hardy, 309 Broadway, is architect and engineer.

Butler, N. J.—The Common Council has arranged for the installation of new switchboard and switchboard equipment at the municipal electric power plant.

Jersey City, N. J.—Electric hoisting equipment and other electrically operated machinery will be installed at the proposed freight terminal to be located here by the Delaware, Lackawanna & Western Railroad Co., estimated to cost in excess of $2,000,000. The company has acquired six blocks of property, bounded by 16th, 18th and Henderson streets and Jersey avenue. A series of modern freight houses and warehouses will be constructed and fully equipped for material handling. Headquarters of the railroad are at 90 West street.

Lincoln Park, N. J.—Resolutions have been adopted by this community providing for the establishment of a lighting district in this section of Pequannock Township. The Township Board is in charge.

Newark, N. J.—Electric lighting and other equipment will be installed in the building to be occupied by the Eastern College of Chiropractic at 1016 Broad street. Convery & Klemmt, 764 Broad street, are architects.

South Amboy, N. J.—Plans are being arranged for lighting the public streets following the expiration of the present contract with the Monmouth Lighting Co. on July 1. It is proposed to perfect other arrangements and not renew the contract. The Common Council is considering the establishment of a municipal electric plant, as well as a proposition to be submitted to the Public Service Electric Co.

Dover, Del.—The water and light committee of the Town Council has approved a bond issue of $30,000 for extensions and improvements in the municipal light and water plant.

Wilmington, Del.—The People's Gas & Electric Co. of America has been incorporated with a capital of $1,000,000 to operate electric and other utilities. The local incorporators are L. A. Irwin, M. L. Rogers and William Singer.

College Hill, Pa.—The Hill Light Co., recently organized, is planning the installation and operation of an electric system in this section. C. J. Braun, Jr., 635 Sixth avenue, Pittsburgh, is treasurer.

Easton, Pa.—The Pennsylvania Edison Co. has been organized to operate in this and surrounding districts. The new company is the result of the proposed reorganization of the Pennsylvania Utilities Co., and this latter company will be absorbed by the new organization in the near future.

Mercer, Pa.—The board of directors of the Mercer Sanitarium will install electrical and mechanical equipment in the proposed 1-story laundry to be erected at the institution.

Palmyra, Pa.—The local council is arranging plans for street lighting. A contract will be awarded to one of the public utility companies operating in this section.

Philadelphia, Pa.—The American Ice Co., Sixth and Arch streets, will make extensions and improvements in its 1-story power house at Belfield avenue and Walnut lane, to cost about $10,000.

Pittsburgh, Pa.—The Pittsburgh Cut Flower Co., 116 Seventh avenue, has perfected plans for the construction of a 1-story power house at its plant at Bakerstown, Pa.

Scranton, Pa.—The Delaware, Lackawanna & Western Railroad Co. has awarded a contract to Sykes & Sons, Scranton, for the erection of a 3-story addition to its Hampton power plant, to be used as a switching station. It will be 23 by 72 ft., and is estimated to cost $50,000.

Baltimore, Md.—Electrical equipment will be installed in the proposed plant to be erected by the Sexton Stove & Manufacturing Co., 500 West Conway street, at an estimated cost of $75,000. W. R. Sexton is president.

Baltimore, Md.—The Standard Oil Co., Canton, has completed plans for the construction of an electrically operated pumping plant at its local works.

Baltimore, Md.—The Public Service Commission has granted permission to the Washington, Baltimore & Annapolis Electric Railroad Co. to issue notes for $1,400,000, the proceeds to be used in part for extensions, improvements, operations, etc.

Watsontown, Pa.—Industrial interests in this vicinity are planning for the construction of a hydroelectric generating plant, to be operated on co-operative lines, furnishing light and

power for industrial service. The different companies in the movement are the Watsontown Boot & Shoe Co., the Wood Products Co., Watsontown Brick Co., Ridgeway Brick Co., Ferro Brick Co., Keystone Brick Co. and others.

Baltimore, Md.—The Public Service Commission is holding a series of hearings relative to the proposed plan of the United Railways & Electric Co. to sell its power house on Pratt street to the Consolidated Gas, Electric Light & Power Co.

Norfolk, Va. — Considerable electrical equipment will be installed by the Board of Water Commissioners in connection with extensions and improvements in the municipal waterworks, estimated to cost $700,000.

Portsmouth, Va.—The city manager, George J. P. Jervey, Municipal building, has plans under way for the construction of additions in the municipal electric pumping plant, used for the waterworks system.

Richmond, Va.—The Bedford Pulp & Paper Co. has perfected plans for the construction of a generating unit at its electric power plant at Colemans Falls, estimated to cost $50,000. William C. Whitney & Co., Virginia Railway & Power building, Richmond, are engineers.

Bluefield, W. Va.—Electrical and mechanical equipment will be installed in the cold storage plant to be constructed by the American Fruit Co. Plans are being drawn.

Lewisburg, W. Va.—The board of directors of the Lewisburg Seminary for Girls has plans under way for the construction of an electric power plant at the institution. Dr. John I. Anderson is president.

Black Creek, N. C.—The city will vote on $10,000 bonds to install electric lighting system. Address W. T. Privett, town clerk.

Elm City, N. C.—The Common Council is arranging for a bond issue of $25,000 for the installation of an electric lighting system. Clarence Winstead is town clerk.

Kinston, N. C.—The Sutton-Newbern Electric Co., recently incorporated, is planning the operation of an electric system in this section. James Sutton heads the company.

Madison, N. C.—Electric light bonds to the amount of $30,000 have been voted. Address P. H. Scales, town treasurer.

Midway, N. C.—The Midway Lighting & Improvement Co. has been incorporated with a capital of $50,000. C. C. Stonestreet is interested.

New London, N. C.—Bonds to the amount of $10,000 have been voted for an electric light and power plant. Address the mayor.

Waynesville, N. C.—The Natural Abrasive Mining Co., recently organized with a capital of $2,000,000, is planning the construction of a hydroelectric power plant in connection with its mining operations in this section.

Rock Hill, S. C.—The Rock Hill Telephone Co. plans to lay conduits for underground cables and make other improvements to its system. Address E. L. Barnes, president.

Columbus (Bibb City), Ga.—Bibb City will expend $150,000 on sewerage extensions, improvements to lighting and street facilities, etc. The project is to be voted on April 6.

Lake Butler, Fla.—The Town Council is arranging plans for the installation of a municipal lighting and ice plant to cost about $30,000.

NORTH CENTRAL STATES.

Malvern, O.—The Valley Electric Co. has been given authority to issue capital stock in the amount of $10,000, the proceeds to be used in paying for properties and betterments.

Blissfield, Mich. — Bonds to the amount of $24,000 have been voted for the purpose of improving the electric light plant. Address A. C. Haas, village president.

Escanaba, Mich. — Engineers are making a test of the city's municipal electric light plant for completing survey of the city's utilities.

Grand Rapids (Creston) Mich.—A committee has been appointed to obtain data on the installation of boulevard lamps on Leonard street from the east end of the bridge to the Grand Trunk railway tracks and along Plainfield avenue. Address Ole Henderson, chairman.

Marshall, Mich.—The Electric Light Commissioners are considering the proposition of constructing an auxiliary plant to the municipal electric light plant, at a cost of $80,000.

Dale, Ind.—The Dale Light & Power Co. has been incorporated with a capital of $15,000 to operate a local electric plant and system. D. J. Wallace, P. W. Fuller and O. V. Brown head the company.

Arenzville, Ill. — The Arenzville Light & Power Co. has filed a petition for permission to construct and maintain an electric transmission line from the city limits of Jacksonville to Concord, Arenzville and Chapin.

Bethalto, Ill.—At the spring election the village will vote on the question of supplying electric light and power to the local community. Address village clerk.

Decatur, Ill.—The city plans to install an ornamental lighting system along the curb lines of each side of Cobb avenue. Address Charles M. Borchere, mayor.

Milwaukee, Wis.—W. N. Albertson & Co., electrical engineers and operators, First Wisconsin National Bank building, have taken over the property of the Missouri Electric, Gas & Water Co., Cainsville, Mo., and contemplate making various changes to the distribution system, as well as install new power-plant equipment. They also intend to build a number of transmission lines to the nearby towns. The general offices of the company will be in the First Wisconsin National Bank building, Milwaukee.

Wisconsin Rapids, Wis.—The Electric and Water Commission will erect an electric substation on the east side of the city. Address F. G. Gilkey, city clerk.

Rushville, Mo. — The Rushville Electric Co., recently organized with a capital of $30,000, is planning the operation of a local electric light and power system.

Lyons, Kan.—The City Council has voted to submit an extra ballot at the spring municipal election providing for the establishment of a municipal electric light plant. The franchise of the United Water, Gas & Electric Co. of Hutchinson, Kan., from which Lyons now buys its electric current, expires in 1923.

SOUTH CENTRAL STATES.

Covington, Ky.—The City Council has approved plans for the installation of electrically operated pumping machinery and other equipment at the city waterworks, at an estimated cost of $100,000.

Prestonburg, Ky.—The Bailey-Ferguson Coal Co., recently organized with a capital of $200,000, is planning the installation of electrical equipment, including motors, etc., at its local properties. A new tipple will be constructed. S. C. Ferguson is vice-president, secretary and general manager.

Attalla, Ala.—The Attala Ice & Cold Storage Co. will improve its ice plant at a cost of several thousand dollars, and will probably electrify the plant.

Birmingham, Ala.—The Alabama Power Co. is arranging for the installation of a new unit at its hydroelectric generating plant on the Coosa river, and has been granted permission for the work by the Public Service Commission. The installation will provide for an increase of about 20,000 hp., bringing the capacity up to 109,500 hp. Thomas W. Martin is president.

Clearwater, Ala.—The city will install an electric light plant. Address the mayor.

Scooba, Miss.—The electric light plant of the Johnson Lumber Co. was damaged by fire recently, causing a loss of $4000.

Oklahoma City, Okla.—Contracts have been let for the construction of a "white way" electric lighting system in the district covered by First street, west of Broadway, and two blocks of Robinson street. The system will consist of 46 single light poles, each carrying a 600-cp. light.

Dallas, Tex.—Construction of an interurban electric railway between Dallas and Terrell by the Dallas Railway Co. has been started. The line, which will be 31 mi. in length, will be completed in 18 mo. Address Richard Meriweather, general manager.

Kerrville, Tex.—The Kerrville Telephone Co. will install switchboard, replace aerial wires, etc. Address D. H. Comparette, manager.

Slaton, Tex.—The Slaton Light Co. has been incorporated with a capital of $15,000. Foster Carroll is interested in the company.

Spur, Tex.—The Spur Electric & Power Co. has plans under way for the proposed addition to its local power plant to cost about $50,000. The extension will be 30 by 50 ft., with installation to comprise engine, generator and auxiliary electrical equipment. F. W. Grogan is head.

WESTERN STATES.

Logan, Utah—It has been recommended that a meter system be installed in the homes of consumers supplied by the municipal electric light plant. Address Lorenzo Hansen.

Seattle, Wash.—Provision for the

use of $2,175,000 bonds to finance the construction of the Gorge creek unit of the city's hydroelectric development project on the Skagit river has been made by the City Council. The contract has been let to S. Morgan Smith & Co. and the Westinghouse Electric & Manufacturing Co., who offered to furnish the machinery for $1,164,804, taking payment therefor in Skagit bonds.

Los Angeles, Cal.—The Southern California Edison Co. has completed plans for a power plant on South Main street, Santa Ana, Cal., to cost about $250,000.

Pasadena, Cal.—Bond issues for the municipal lighting department and the city farm will be submitted to the voters at an election to be held April 7. Address C. W. Koiner, general manager of the municipal lighting department.

Red Bluff, Cal.—Plans have been prepared by City Engineer W. F. Luning for the establishment of a municipal plant for providing the city with electric light and power. The estimated cost of the project is $169,-186.

Mexicali, Mexico—Plans are being prepared for a light and water plant for the city. The Mexicali Light & Water Co., recently organized with a capital of $200,000, is to supply both light and water to the municipality. By the new plan a power plant of 1500 hp. will be installed as soon as possible and the water plant will be built at a later date. Address A. V. Aldrate, president.

CANADA.

Calgary, Alta.—Plans are being prepared for a power plant to be erected by the provincial government at a cost of $150,000.

INCORPORATIONS.

Pittsburgh, Pa.—The J-E Battery & Supply Co. To manufacture storage batteries, etc. Incorporators: J. W. Daniels, W. H. Virgin, D. A. Mahoney and Austin L. George. 1110 Park building.

Chicago, Ill. — National Electric Fixture Co. Capital, $25,000. To manufacture electrical specialties. Incorporators: Bernard M. Smith, William C. Duncan and W. F. Higgins, 15 South Clinton street.

Detroit, Mich.—Michigan Manufacturing Co. Capital, $25,000. To manufacture carburetors and ignition equipment. Incorporators: W. S. Burch, D. M. Harper and Frank Reynolds, 665 Hagen avenue.

London, Can.—London Motors, Ltd. Capital, $1,000,000. To manufacture motors, engines, etc. Incorporators: Thomas H. Griffith, W. R. Stansell and T. A. Conley.

Boston, Mass.—Ivar-Lite, Inc. Capital, $250,000. To manufacture electric lamps and electrical apparatus. Incorporators: G. Ivar Johnson, Malden, Mass.; Herbert K. Feeney, Brookline, Mass., and Robert G. H. Willison, Allston, Mass.

Newark, N. J.—Globe Electrical Fixture Manufacturing Co. Capital, $10,000. To manufacture electrical fixtures and other electrical equipment. Incorporators: Pemberton Dudley, Fred Wilson and William H. Freeman.

Bloomfield, N. J.—John A. Standish Manufacturing Co. Capital, $5,000. To manufacture electrical equipment. Incorporators: Charles J. Flessa, Edward Maguire and Howard I. Edge, 134 South Oxford street, Brooklyn.

Allentown, Pa.—Thomas & Holben Electrical Repair Co. is being organized by Edward J. Thomas, Wayne F. Holben and Elwood S. Thomas, to manufacture electrical equipment and operate a general electrical repair plant. Application will be made for a state charter.

New York, N. Y.—Sunset Fixture Co. Capital, $20,000. To manufacture lighting fixtures and other electrical products. Incorporators: A. C. Mandel, J. J. Lazaroe and E. Goodman, 1480 Washington avenue, Bronx.

Brooklyn, N. Y.—Bedford Lamp Works. Capital, $15,000. To manufacture incandescent electric lamps. Incorporators: S. E. Gertler, C. G. Katz and A. Adler, 411 Bedford avenue.

New York, N. Y.—Oceanic Electrical Supply Co. Capital, $20,000. To manufacture electrical equipment and supplies. Incorporators: J. V. Schraig, L. M. Fox, and J. J. Gill, 1941 Benson avenue, Brooklyn.

Buffalo, N. Y.—Learman, Wende & Charnock, Inc. Capital, $50,000. To engage as electrical and mechanical engineers. Incorporators: H. A. Wnde, F. J. Learman and G. H. Charnock.

Springfield, Mass.—United Electric Service Co. Capital, $100,000. To manufacture electrical appliances and equipment. Incorporators: Edward A. Higney, Palmer, Mass.; John G. Waddell and Charles J. Weston, Springfield.

Newark, N. J.—The Wayside Telephones, Inc. Capital, $200,000. To install and operate a telephone system in different rural districts in this section. Incorporators: Albert M. Lamberton, Westfield, N. J.; John W. Seaton and Jesse J. Adams, Montclair.

Concord, N. H.—Crawford Manufacturing Co. Capital, $115,000. To manufacture electric motors. Incorporators: John J. Crawford, Philip Gill and Clarence R. Blanchard.

New York, N. Y.—Dual Ignition & Manufacturing Co. Capital, $30,000. Incorporators: C. H. Hammond, B. S. Henney, Sea Cliff, N. Y., and others.

Schenectady, N. Y.—Electric Railway Securities Corp. has been organized, with a capital of $1,000,000, by the General Electric Co., the Westinghouse Electric & Manufacturing Co. and the J. G. Brill Co., Philadelphia. The new organization will devote its operations to financing the sale of electrical equipment for street-railway service, and will not carry any other connection between the three companies.

Chicago, Ill.—Industrial Electrical Co., 432 North State street. Capital $7000. Incorporators: Neil M. Thompson, Jr., Sidney A. Marsh and Martin W. Swanson.

Belleville, N. J.—Electric Motor & Appliance Co. To manufacture electrical equipment and appliances. Incorporators: Thomas H. Brooks, Jr., 69 Washington street, and others.

Detroit, Mich.—Viking Motors Co. Capital, $100,000. To manufacture motors for aircraft service, etc. Incorporators: Fred H. Aldrich, Robert L. Bailey and John W. Swartz, 2204 West Grand boulevard.

Pittsburgh, Pa.—Keps Electrical Supply Co. To manufacture electrical fixtures and supplies. Incorporators: Edward J. Kelsky, Monroe W. Petre, John Ehler and Jacob L. Simon, 1409 Park building.

Greenville, N. C.—Greenville Storage Battery Co. Capital, $50,000. To manufacture storage batteries and other electrical equipment. Incorporators: W. G. Downing, president; W. T. Bryant, vice-president and manager.

Fall River, Mass.—Cotter & Yates Electric Co. Capital, 100 shares of stock no par value. To manufacture electrical specialties. Incorporators: John Cutter, William B. Yates and George Grime.

Whitman, Mass.—National Electric Corp. Capital, $5000. To manufacture electrical equipment. Incorporators: Harold B. Huntley, Harry G. Barnes and J. M. Hathaway.

PROPOSALS.

Detroit, Mich.—Bids will be received April 4 for the furnishing of one carload of cedar poles. Address E. J. Bostick, city clerk.

Fort Wayne, Ind.—Bids will be received in March or the early part of April for a new central fire-alarm station to be installed at a cost of $40,000. Address Board of Safety.

Washington, D. C.—A. L. Flint, general purchasing offcer for the Panama Canal, will receive bids up to March 31 for a quantity of material, including electrical supplies and fixtures, and other electrical specialties, for Canal Zone service, all as set forth in Circular 1439.

FOREIGN TRADE.

[Addresses of firms referred to in these trade opportunities may be obtained by writing to the Bureau of Foreign and Domestic Commerce, Washington, D. C., or its branch and local co-operative offices. Request for each opportunity should be on a separate sheet and the file

Electrical Supplies (34,422)—A firm of engineers in England desires to purchase or secure an agency for articles used in electrical and mechanical engineering, such as glass and metal reflectors or shades and electric motor accessories. Quotations should be given c. i. f. London. Reference.

Electrical Specialties (34,442)—A mercantile distributing company in Canada desires to secure an agency for the sale of electrical specialties. Reference.

Electrical Goods, etc., (34,542)—A company of manufacturers and importers in India, desires to be placed in connection with firms for the importation of electrical goods, telephones, etc. References.

Electrical Appliances (34,553)—A firm in Italy desires to secure an agency for the sale of electrical household appliances, vacuum cleaners, etc. Quotations should be given c. i. f. Italian port. Correspondence should be in French or Italian. References.

FINANCIAL NEWS

Comment on the Financial Outlook in the Electrical Industry, New Securities, Reports of Earnings, Dividends and Utility Stocks

New Issue of Wisconsin River Power Co.'s Bonds.

The bond department of the Fort Dearborn Trust and Savings Bank, Chicago, is offering a new issue of Wisconsin River Power Co.'s 10-year collateral gold notes, series "A," at 93.25 and interest, yielding 8%. The Wisconsin River Power Co. was organized under the laws of Wisconsin in 1907 and its hydroelectric power plant is one of the largest in the state of Wisconsin. The company supplies electrical energy to a large portion of central and southern Wisconsin. It is stated that the earning capacity of the property shows a wide margin over fixed charges.

American Gas & Electric Co. and Subsidiaries.

The American Gas & Electric Co. reports gross earnings of subsidiary companies for the year ended Dec. 31, 1920, of $15,350,937, compared with $12,331,196 for 1919. Net earnings were $4,686,281, against $3,867,100 for the previous year, while amount applicable to preferred dividends of American Gas & Electric Co. was $1,971,080, equal to 4.25 times the amount required for dividend payment on the company's $7,696,750 outstanding preferred stock, and compared with $1,983,937 for 1919. Surplus after payment of preferred dividends was $1,509,275, equal to over 26% on the company's $5,772,650 outstanding common stock. This compares with $1,597,107 for 1919 and $587,966 for 1918. More than 90% of gross earnings of the company are derived from electric power and light business, which during the past few years has proven much more profitable than other public utility business, and accounts for the good showing in earnings during that time.

Montana Power Co.

The report for the quarter ended Dec. 31 shows:

	1920.	1919.
Gross earnings	$1,945,661	$1,757,179
Net earnings	1,164,192	1,113,316
Surplus after interest, etc.	721,182	557,023

Columbia Gas & Electric Co.

The annual report shows a surplus for the year 1920 of $4,859,377. This was $1,581,977 in excess of the surplus for 1919. The income account compares as follows:

	1920.	1919.
Gross earnings	$14,616,742	$11,950,272
Net income	5,533,794	3,962,788
Surplus for year	4,839,377	3,257,400

Surplus for 1920 was equal to $9.68 a share against $6.51 a share in 1919.

Idaho Power Co.

	1920.	1919.
December gross	$ 182,357	$ 163,897
Net after taxes	84,693	69,988
Total income	98,585	76,962
Surplus after charges	46,448	38,004
Twelve months' gross	2,300,613	1,816,949
Net after taxes	1,194,571	883,054
Total income	1,305,359	947,464
Surplus after charges	770,658	486,228
Balance after preferred dividends	686,902	425,008

Dayton Power & Light Co.

	1921.	1920.
January gross earnings	$381,448	$329,416
Operating expenses (including depreciation and taxes)	280,074	221,387
Net earnings	101,374	108,029
Non-operating revenue	904	2,943
Total income	102,278	110,972
Interest on bonds	37,658	32,113
Other deductions (includes other interest and sinking fund)	14,613	18,677
Total deductions	52,271	50,790
Net income	50,007	60,182
Dividends on preferred stock	17,865	17,091
Surplus	32,142	43,091
Operating ratio	73.42%	67.21%

Commonwealth Power, Railway & Light Co. and Subsidiaries.

	1921.	1920.
January gross	$2,843,696	$2,598,959
Net after taxes	966,356	898,139
Surplus after fixed charges	351,373	352,710
Balance after preferred dividends	261,608	262,945
Twelve months' gross	31,530,718	26,414,305
Net after taxes	8,963,900	9,060,523
Surplus after fixed charges	1,873,580	2,534,914
Balance after preferred dividends	796,400	1,457,734

Note—Fixed charges include interest and dividends on outstanding preferred stock of constituent companies.

Columbia Gas & Electric Co.

The Columbia Gas & Electric for January and the 12 months' ended Jan. 31, 1921, reports earnings as follows, comparison being made with January, 1920, and the previous 12 months' period:

		Increase.
January gross	$1,598,136	$ 195,823
Net after taxes, including other income	1,059,502	77,139
Surplus after fixed charges	630,814	51,557
Twelve months' gross	14,810,186	2,466,893
Net after tax, including other income	9,988,656	1,775,952
Surplus after charges	4,888,099	1,588,895

Consumers Power Co.

Including operations of Michigan Light Co.

	1921.	1920.
January gross	$1,293,490	$1,180,526
Net after taxes	524,683	416,233
Surplus after fixed charges	339,942	269,833
Balance after preferred dividends	272,795	205,404
Twelve months' gross	14,270,418	11,674,593
Net after taxes	4,430,266	4,289,135
Surplus after fixed charges	2,278,966	2,608,164
Balance after preferred dividends	1,494,745	1,837,159

United Gas & Electricc Co.'s Subsidiaries.

	1921.	1920.
January gross	$1,175,029	$1,104,370
Net after taxes	391,858	386,362
Total income	407,062	404,462
Surplus after charges	172,380	182,103
Twelve months' gross	12,214,765	10,444,558
Net after taxes	3,630,344	3,567,751
Total income	3,923,432	3,774,078
Surplus after charges	1,393,654	1,477,502

Northern Ohio Electric Corp.

	1921.	1920.
January gross	$ 812,742	$ 882,012
Net after taxes	138,947	264,884
Deficit after fixed charges	12,452	*134,625
Deficit after preferred dividends	42,452	*104,625
Twelve months' gross	10,945,574	9,483,718
Net after taxes	2,358,749	2,685,517
Surplus after fixed charges	686,340	1,169,122
Balance after preferred dividends	326,340	809,122

*Surplus.

Great Western Power System.

	1921.	1920.
January gross	$ 641,325	$ 496,221
Net after taxes	424,567	257,720
Surplus after charges	238,125	101,135
Twelve months' gross	6,689,052	5,448,394
Net after taxes	3,815,954	3,079,010
Surplus after interest charges	1,837,130	1,383,645

Dividends.

	Term.	Rate.	Payable.
Am. Gas & El., com	Q	2.5%	Apr. 1
Am. Gas & El., pfd	Q	1.5%	May 2
Bangor Ry. & El., pfd	Q	1.75%	Apr. 1
Carolina Pr. & Lt., pfd	Q	1.75%	Apr. 1
Consumers' Pr., pfd	Q	1.5%	Apr. 1
Dayton Pr. & Lt., pfd	Q	1.5%	Apr. 1
Kansas Gas & El., pfd	Q	1.75%	Apr. 1
Manhattan El. Sup., com.	Q	$1.50	Apr. 1
Manila El. R. R. & Lt.	Q	$1.50	Apr. 1
Public Ser. Corp. of N. J., com.	Q	1%	Mar. 31
Yadkin River Pr., pfd.	Q	1.75%	Apr. 1

WEEKLY COMPARISON OF CLOSING-BID PRICES OF SECURITIES OF LEADING ELECTRICAL COMPANIES.

Quotations furnished by F. M. Zeller & Co., Rookery Bldg., Chicago.

Public Utilities—	Div. rate. Per cent.	Bid Mar. 15.	Bid Mar. 22.
Adirondack Electric Power of Glens Falls, common	6	12	14
Adirondack Electric Power of Glens Falls, preferred	6	71	71
American Gas & Electric of New York, common	..	101	101
American Gas & Electric of New York, preferred	6	36½	36½
American Light & Traction of New York, common	..	101	103
American Light & Traction of New York, preferred	6	81	82
American Power & Light of New York, common	4	50	50
American Power & Light of New York, preferred	6	67	69
American Public Utilities of Grand Rapids, common	..	8	7
American Public Utilities of Grand Rapids, preferred	7	18	17
American Telephone & Telegraph of New York	..	101	101
American Water Works & Elec. of New York, common	..	3½	4
American Water Works & Elec. of New York, particip	7	6½	6½
American Water Works & Elec. of New York, 1st preferred	..	41	42
Appalachian Power, common	..	3	3
Appalachian Power, preferred	7	24	24
Cities Service of New York, common	+extra	230	231
Cities Service of New York, preferred	6	67	66½
Commonwealth Edison of Chicago	8	107	108
Comm. Power, Railway & Light of Jackson, common	..	13	13
Comm. Power, Railway & Light of Jackson, preferred	6	33	35
Federal Light & Traction of New York, common	..	6½	6½
Federal Light & Traction of New York, preferred	..	42	42
Northern States Power of Chicago, common	..	46	46
Northern States Power of Chicago, preferred	ex.div.7	79	79
Pacific Gas & Electric of San Francisco, common	..	47	47
Public Service of Northern Illinois, Chicago, common	7	76	76
Public Service of Northern Illinois, Chicago, preferred	6	82	80
Standard Gas & Electric of Chicago, common	..	11	11
Standard Gas & Electric of Chicago, preferred	8	34	34
Tennessee Railway, Light & Power of Chattanooga, common	..	1	1
Tennessee Railway, Light & Power of Chattanooga, preferred	6	5½	5
Western Power of San Francisco, common	..	25	24
Western Union Telegraph of New York	..	87	88
Industrials—			
Electric Storage Battery of Philadelphia, common	4	98	98
General Electric of Schenectady	8	128	135
Westinghouse Electric & Mfg. of Pittsburgh, common	7	47	47